PULP & PAPER

November 1983

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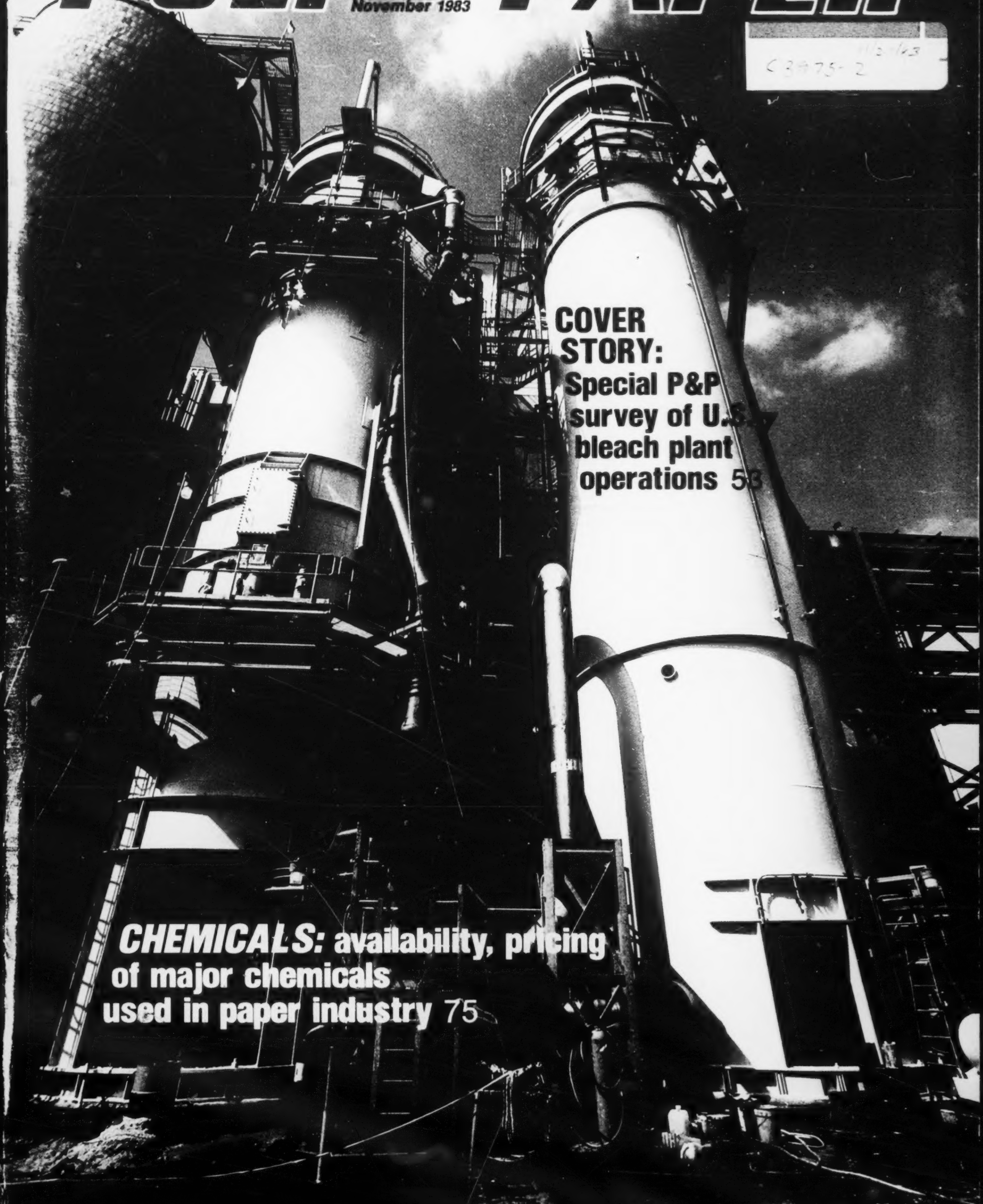

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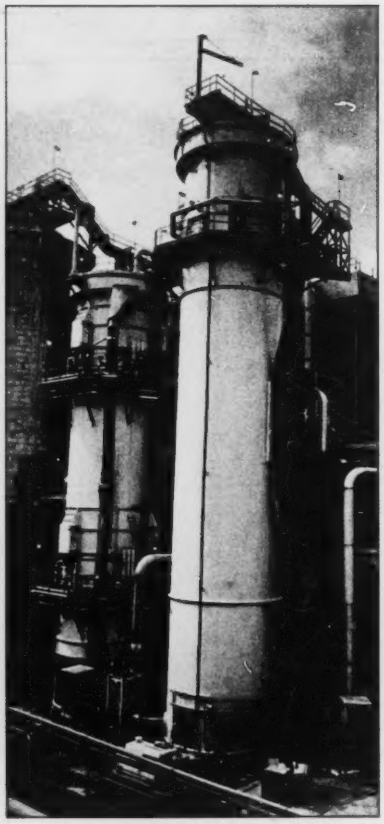

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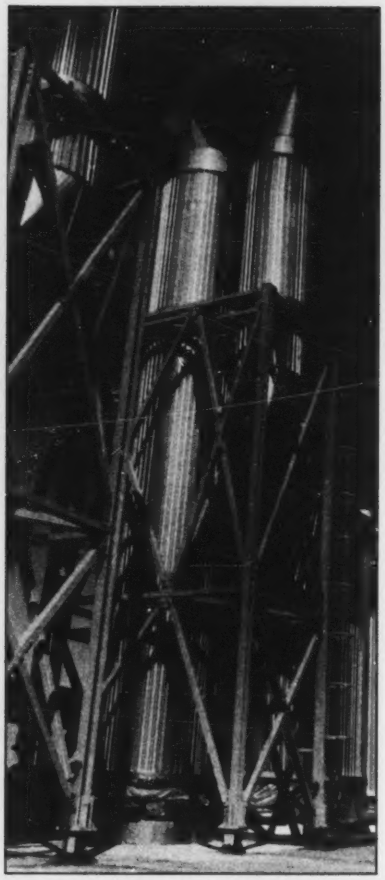

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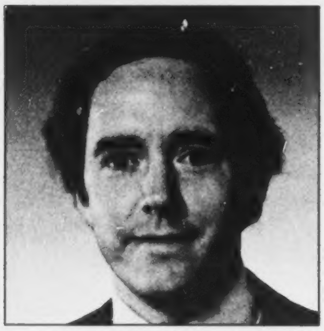

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ABP
BPA

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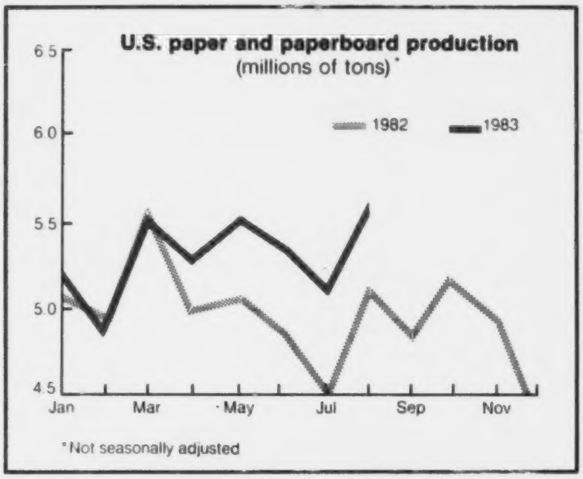
MONTH IN STATISTICS

U.S. paper and paperboard production totaled 5.618 million tons in August, the first time the monthly total has moved above 5.6 million tons, according to the American Paper Institute. The August total was up 9.4% from August 1982. The July-August two-month moving average of seasonally adjusted data stood at 65.1 million tpy, down slightly from the July level of 65.3 million tpy. Total paper and paperboard production through August averaged 63.2 million tpy, up 6.9% from 1982.

Among major grades, printing and writing paper grades for the first eight months surpassed the 17-million-tpy mark for the first time, with production through August up 9.4% from a year earlier. Newsprint recovered somewhat in August, returning to its 1982 level. Paperboard production through August was up 7.3% from last year, with containerboard up 9.2%. Corrugated box shipments through August were up 6.0% from 1982 levels, according to the Fibre Box Assn.

Canadian newsprint shipments totaled 696,000 metric tons in August, up 16.5% from August 1982, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates stood at 86% compared with 75% last August.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	August	458	-11.7	5,150	0.1
Uncoated groundwood (s)	August	128	−1.5	1,467	2.3
Coated paper (s)	August	503	15.1	5,520	10.8
Uncoated free sheet (s)	August	756	16.3	8,604	10.0
Unbleached kraft packaging and industrial (s)	August	348	6.7	3,754	2.6
Tissue	August	390	5.4	4,692	6.6
Total paper	**August**	**2,872**	**10.8**	**32,392**	**6.6**
Kraft linerboard, unbleached	August	1,305	8.2	14,836	9.2
Semichemical medium	August	406	16.3	4,665	5.8
Bleached paperboard	August	327	3.5	3,890	3.1
Recycled paperboard	August	620	8.4	7,111	8.2
Total paperboard	**August**	**2,747**	**8.0**	**31,593**	**7.3**
Total paper and paperboard*	**August**	**5,618**	**9.4**	**63,985**	**6.9**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	July	4,114	10.2	51,840	3.6
Market pulp production	July	495	29.6	6,369	8.9
Wastepaper consumption at paper/board mills	July	1,128	9.2	14,146	5.5
Pulpwood consumption (cords)	July	6;801	0.9	84,518	7.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	August	22,649	10.7	166,104†	6.0
Containerboard inventories at box plants	August 1	2,486	−6.1		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	July	702	20.0	8,594	8.1
Imports of Canadian newsprint	July	535	19.1	6,676†	1.3
U.S. paper exports (including products)	July	412	15.4	4,611	7.3
Exports of unbleached kraft linerboard	August	190	11.8	2,223	11.8
Exports of woodpulp	July	259	−0.8	3,560	1.4
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	August	696	16.5	5 451†	1.8
Operating rates	August	86%	75%	83%	85%
Inventories held by U.S. consumers	August 31	1,322	−12.0		
Woodpulp shipments (export only)	August	618	26.4	4,384†	11.6
Operating rates	August	90%	72%	83%	81%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Equity financing running at record pace

Equity financing activity in the forest product industry proceeded at a record pace during the first eight months of 1983, with 15 separate transactions raising a total of $917 million, according to analysts Thomas P. Clephane and Jeanne Carroll of Morgan Stanley & Co.

"The range of equity-linked financings was striking, with seven common-stock sales securing $524 million, four convertible exchangeable preferred issues totaling $290 million, three convertible debt deals amounting to $75 million, and one debt/equity swap," they noted. The financing deals ranged in size from $154 million for Weyerhaeuser and $121 million for Scott Paper to $14 million for Pentair and included two $100-million issues of convertible exchangeable preferred by St. Regis and Boise Cascade.

The analysts predicted that "receptivity of the capital markets, combined with improving prospects for economic growth in 1984, will encourage further equity-linked offerings by other forest products and paper companies."

- Clephane and Carroll also commented on the apparent success of Sir James Goldsmith in liquidating Diamond International assets.

Goldsmith acquired 100% of Diamond's stock in five stages from 1979 through 1982 for a total of $658 million. Six different Diamond manufacturing operations have already been sold in separate transactions, with cash proceeds from the sales totaling $440 million. These divestitures included the tissue/white paper mills sold to James River for $170 million and the recycled paperboard and converting operations sold to Jefferson Smurfit for $80 million.

In addition, Travelers Insurance in August granted an option to the Goldsmith interests to sell the insurance company 657,000 acres of western timberland. If the option is exercised within three years, Diamond would receive $250 million in cash. In addition, Diamond recently completed the sale of its retail building products division to Michigan General Corp. for $120 million. Diamond also has 892,000 acres of Northeast timberland, mostly located in Maine, which is up for possible sale.

1983 equity and equity-linked financings in the paper and forest products industry

Company	Type of security	Amount sold (millions of $)	Date
James River	Common stock	$ 83	1/11/83
Boise Cascade	Conv. Exch. PS	100	1/21/83
Great Northern	Conv. Exch. PS	40	2/25/83
Southwest Forest	Conv. Sub. Debs.	40	3/17/83
Stone Container	Common stock	39	3/23/83
Crown Zellerbach	Conv. Exch. PS	50	4/7/83
Mead	Common stock (debt/equity swap)	28	4/8/83
Weyerhaeuser	Common stock	154	4/14/83
Hammermill	Conv. Sub. notes	25	4/30/83
Scott Paper	Common stock	121	5/24/83
St. Regis	Conv. Exch. PS	100	6/30/83
Southwest Forest	Conv. Sub. Debs.	10	7/5/83
Masonite	Common stock	38	7/11/83
Pentair	Common stock	14	7/11/83
James River	Common stock	75	8/11/83
Total		**917**	

Conv. = convertible; Exch. = exchangeable; PS = preferred stock; Sub. = subordinated; Debs. = debentures.
Source: Morgan Stanley & Co.

"The Diamond transactions are interesting because Sir James stands to realize proceeds estimated at $1.024 billion, or a pretax profit of $366 million above his acquisition cost of $658 million, before repayment of $55 million in pro forma long-term debt," according to the Morgan Stanley analysts. And Goldsmith could sell the western timberlands—which have an estimated fair-market value of more than $800 million—to another party for a much higher price.

ACQUISITIONS

PCA to buy Diamond molded pulp plants

Packaging Corp. of America announced that it has acquired some of the domestic and foreign assets of Diamond International Corp.'s molded fiber products division for an undisclosed amount.

The domestic assets being purchased include molded pulp plants in Red Bluff, Calif., and Plattsburgh, N.Y., a research center in Portland, Maine, and an idle plant in Middletown, Ohio. PCA has no immediate plans to reopen the Middletown plant, it said. PCA also has an option to acquire Diamond's molded pulp plant at Palmer, Mass.

Foreign operations purchased by PCA include Omni-Pac GmbH of Elsfleth, West Germany, with sales offices in several European countries, and Hartmann Fibre Ltd. of Great Yarmouth, England.

PCA previously had two molded pulp plants in the U.S., in Macon, Ga., and Griffith, Ind.

EXPANSIONS

St. Regis/Tenma explore joint venture

St. Regis Corp. and Tenma Paper Mills & Co. are "exploring" a joint venture to produce bleached paperboard. The project would use a portion of St. Regis's kraft mill near Pensacola, Fla., which is scheduled for permanent shutdown. Production would be exported by Tenma to Japan.

The proposed venture would revitalize portions of the 250-tpd No. 1 mill at Pensacola, which houses two machines. One of the machines, a 106-in.-wide cylinder unit, was shut down in 1982 and is currently for sale.

The other 144-in.-trim machine is scheduled for closure later this year, once the $17-million conversion of No. 3 machine from production of unbleached kraft paper to 400 tpd of both bleached and unbleached grades is completed. No. 3 machine is located in the newer No. 2 mill, which also houses an unbleached kraft paper machine and the new 665-tpd Stress Kraft paper machine installed in 1981 as part of a massive $250-million mill modernization.

It will take at least six months and possibly two years before Tenma decides if the project is feasible, the company's U.S. representative, Leo E. Weckerle, told a local paper.

MARKETS

Strong U.S. dollar hurts pulp prices. . .

Hopes for a large fourth-quarter market pulp price increase in Europe vanished in September with Canadian and Scandinavian producers announcing an unchanged $440/metric-ton price for northern bleached softwood kraft. Southern U.S. producers, however, did manage to lift list prices for pine by $20/ton to $420 and mixed hardwood by $10 to $395, although several producers were forced to scuttle earlier announced plans for $40/ton increases on these grades.

The size of the increase was a big disappointment to Canadian and U.S. producers, most of whom have been operating at a loss. But there was considerable resistance to higher prices from European buyers, who had already seen their pulp prices rise by 18% to 25% this year, mostly due to the strong U.S. dollar. And Scandinavian suppliers had little incentive to lead a price increase since they have been profitable at recent price levels due to devalued currencies. Producer pulp inventories at the end of August of 1.63 million metric tons were also relatively high, with most of the excess concentrated in softwood grades.

Producers now are concentrating on bringing up NBSK transaction prices to actual list levels, which in the third quarter were averaging about $420/metric ton in northern Europe. This would amount to a $20/ton price increase and set the stage for a first-quarter price hike, especially if the weakening trend in the dollar begun in August continues.

Domestic increase. NBSK prices in the domestic U.S. market are also remaining unchanged at the $450/metric-ton level for the fourth quarter. Northern hardwood, however, is being increased by $20/ton to $420, while southern grades are rising $25/ton to $425 for pine and $400 for mixed hardwoods, with customers reportedly accepting the hike.

But the situation could change dramatically with any industry-wide strike in British Columbia longer than a month.

Strong U.S. dollar has caused cost of NBSK to rise in major buying currencies . . .
(per metric ton, c.i.f.)

	9/1/83	% change from 1/1/83	1/1/83	% change from 1/1/82*
U.S.$ price	430	+ 4.9%	410	−24.8%
In buyers' currencies				
France (franc)	3,472	+25.8	2,759	−11.0
Italy (lira)	688,860	+22.9	560,470	−13.8
W. Germany (mark)	1,152	+18.0	976	−24.7
U.K. (pound)	288	+13.4	254	−24.4
Japan (yen)	105,608	+10.1	95,940	−24.8

...and given Nordic producers a big cost advantage

	9/1/83	% change from 1/1/83	1/1/83	% change from 1/1/82*
In sellers' currencies				
Canada (C$)	529	+4.5	506	−21.7
Finland (markka)	2,468	+14.0	2,165	−8.9
Sweden (krona)	3,401	+13.9	2,985	−1.6

*Percent change based on $545 list price in effect at the beginning of 1982.

. . . and linerboard in overseas markets

U.S. linerboard producers are now hoping for a Jan. 1 price increase in northern Europe, where no move was set for the fourth quarter despite the success of the recent $20/short-ton increase in the U.S. The new eastern U.S. price of $290/short ton corresponds to a c.i.f. price in northern Europe of about $380/metric ton for heavyweight board.

The official fourth-quarter European price, however, will remain at the $333/metric-ton "minimum" price established by the EEC last spring—which represents about the maximum price currently being paid.

Industry observers say that so far linerboard demand in Europe has been "cautious" coming off the long summer lull. Domestic test liner in some countries is reported to be selling 20% to 30% below imported kraft linerboard. There has also been keen competition from Scandinavian, Portuguese and Brazilian producers who are benefiting from weak currencies and who have the advantage of lower or no duty. Meanwhile, French customs authorities were reportedly investigating sales below the minimum price level.

Asian market. In Southeast Asia, regular U.S. suppliers in September implemented about a $30/metric-ton price increase, which brings the general price level in this region to around $345/ton c.i.f., although spot discounting persists. However, prices in this region—a dumping ground during the recession—still have a long way to go before returning to their prerecession peak of around $460/metric ton.

Orders from the two largest Far East importing countries have picked up strongly this year, with first-half 1983 shipments up 44% to Japan and 139% to the People's Republic of China compared to a year ago.

U.S. unbleached kraft linerboard exports for the first six months of 1983 to selected major importing countries

Country	Quantity (short tons)	% change from '82	Value ($000)	$ change from '82
United Kingdom	143,176	+14.9%	$ 38,222	+1.4%
Fed. Rep. Ger.	57,062	−31.9	15,015	−38.3
Italy	74,532	+40.0	17,306	+9.2
Netherlands	20.086	−14.7	5,124	−31.4
France	18,362	+28.6	4,705	+11.8
Japan	77,379	+44.1	21,834	+28.7
China (PRC)	80,219	+139.0	14,843	+94.0
Hong Kong	44,273	+133.5	9,627	+55.2
Philippines	27,446	−44.2	5,882	−59.9
Costa Rica	40,727	−4.6	9,254	−19.2
Panama	34,561	+13.6	7,337	+0.9
Honduras	29,691	−11.3	6,771	+21.7
Colombia	27,748	+21.2	6,618	+2.2
Ecuador	18,793	−17.4	5,241	−29.5
Israel	26,625	−2.8	6,902	−18.4
Nigeria	9,413	−34.9	2,156	−46.8
Total*	1,042,139	+16.3	250,793	−6.5

*All countries, including those not listed.
Source: U.S. Dept. of Commerce.

WORLD CAPACITY

FAO survey sees slowdown for 1982-87

Worldwide capacity for paper pulp production will rise from 156.5 million metric tons in 1982 to 168.5 million tons by 1987, according to the United Nations' Food & Agriculture Organization in its *Pulp & Paper Capacities 1982-1987*. The increase represents an annual growth rate of 1.5%, compared with 1.9% for the previous five-year period. World paper and paperboard capacity will grow from 208.4 million tons in 1982 to 226.8 million tons by 1987, the report estimates, a rate of 1.8%/year, down from an annual rate of 2.6% in the year-earlier report.

Some 77% of world paper and board capacity in 1982 was in what the FAO terms "developed market economies," 9% in "developing" countries, and 14% in "centrally planned" economies.

Paper grades. World capacity for newsprint and printing/writing papers is expected to grow at an annual rate of 2.3% from 1982 to 1987, with other paper and paperboard grades pegged at 1.3%. Growth of capacity in developing market countries is estimated at 3.6%.

World woodpulp capacity, 1982-87

	Capacity (000 metric tons)		Annual average increase	
	1982	1987	1977-82	1982-87
World total	144,922	155,947	1.8	1.6
Developed economies	118,679	125,849	1.0	1.2
North America	72,392	76,181	1.7	1.0
Japan	12,291	12,694	0.8	0.6
Western Europe	30,805	33,018	−0.4	1.4
Oceania	2,411	2,730	2.7	2.5
Others	780	1,226	0.1	9.4
Developing economies	7,990	10,437	7.6	5.5
Africa	687	904	15.8	5.7
Latin America	5,596	7,406	6.4	5.7
Asia	1,707	2,127	9.2	4.6
Centrally planned economies	18,253	19,661	3.7	1.6
Asia	2,896	3,150	4.4	1.8
Eastern Europe	4,107	4,461	2.7	1.7
U.S.S.R.	11,250	12,050	4.1	1.4

World paper and paperboard capacity, 1982-87

	Capacity (000 metric tons)		Annual average increase	
	1982	1987	1977-82	1982-87
World total	208,428	226,823	2.5	1.8
Developed economies	161,012	173,836	1.8	1.6
North America	80,785	85,818	1.9	1.2
Japan	22,849	25,315	1.9	2.1
Western Europe	53,260	57,390	1.6	1.6
Oceania	2,525	3,316	2.7	5.5
Others	1,593	1,997	4.6	4.6
Developing economies	18,278	21,838	7.6	3.6
Africa	886	1,240	6.4	7.0
Latin America	10,257	12,449	6.0	3.9
Asia	7,135	8,149	10.9	2.7
Centrally planned economies	29,138	31,149	3.4	1.4
Asia	9,734	10,284	2.8	1.2
Eastern Europe	6,404	6,865	2.1	1.4
U.S.S.R.	13,000	14,000	4.4	1.6

Source: FAO Pulp & Paper Capacities 1982-1987

Newsprint capacity of 31.2 million tons in 1982 is expected to increase by 3.7 million tons to 34.9 million tons by 1987. Printing/writing grades should rise by 6.1 million tons from 51.6 million tons in 1982 to 57.7 million tons by 1987.

Other paper and board grades were reported at 125.6 million tons of capacity in 1982, and these grades are now estimated to reach 134.2 million tons of capacity by 1987. This is a substantially slower growth rate than had been previously expected.

Pulp. Chemical pulp represents 63% of total pulp in the FAO survey, and it will reach 106.3 million tons by 1987, adding 7.1 million tons in the five-year period. Thermomechanical pulp is expected to reach 11.2 million tons by 1987, an addition of 3.0 million tons. For other mechanical pulp grades, a decrease of 0.6 million tons in the developed market countries results in a worldwide increase of only 0.3 million tons in 1982-87.

The apparent ratio of paper pulp to paper production continues downward, reports FAO, falling to 75% in 1982 and to 74% by 1987.

WOOD PRODUCTS

L-P ends talks to buy Diamond plants

Louisiana-Pacific Corp. has ended a previously planned acquisition of Diamond International Corp.'s wood products facilities because the companies could not work out "an acceptable timber supply contract." The facilities which would have been acquired included eight sawmills in California, Idaho, Montana and Oregon and two plywood and two millwork plants in Oregon and California.

- In the meantime, **Michigan General Corp.** has reportedly completed the acquisition of Diamond International's retail lumber and building products division for approximately $120 million.
- **Georgia Kraft Co.** plans to construct a new lumber mill with an annual capacity of 67 million bd ft at Cottonton, Ala. The decision to build the mill was based on commitments made by the states of Alabama and Georgia to build a bridge over the Chattahoochee River near the proposed facility.
- **Trus Joist Corp.** has acquired an option from Willamette Industries to purchase an idle plywood plant on a 69-acre site in Natchitoches, La. Trus Joist would use the plant to make laminated-veneer lumber, a high-strength lumber now produced only on the West Coast. The plant could reopen by the end of 1984.
- **Chesapeake Corp. of Virginia** plans to build a wood-preservative plant on a site being purchased in the Bethlehem-Easton area of Pennsylvania. The $1.5-million plant, Chesapeake's third such facility, is scheduled to start up in January 1984.
- **Bohemia Inc.** has permanently shut down its Junction City, Ore., plywood plant, idle since October 1981, and its Brownsville, Ore., lumber mill.

FORECAST

Woodpulp consumption seen rising

World cellulose fiber consumption should rise at a 3.6%/year rate through 1985, slowing to 3.2% between 1985 and 1995, compared to a historic rate of 3.0%, according to a recent study by Predicasts Inc. Total fiber consumption is projected to reach 288 million tons in 1995, up from 183 million tons in 1981.

"This will be the result of a more favorable outlook for paper and paperboard production," the study said, with improving economic growth and major adjustments to lower basis weights and other conservation measures largely completed in the 1970s.

"The increasing demand in cellulose fibrous pulp is anticipated to place substantial pressure on forest resources in the world," according to the Cleveland, Ohio-based market research firm.

Only North America, Scandinavia, South America, the U.S.S.R. and central Africa possess enormous forest resources. But significant increases in forest yield are impossible in Scandinavia, while timber utilization in South America, the U.S.S.R. and Africa is held back by lack of infrastructure—leaving Canada and the southern U.S. with "the best potential in supplying the world's fiber needs," according to analyst Eunice Lee.

Smaller share for woodpulp. As a result, the share of woodpulp in total fiber consumption is projected to decline further, with increasing use of wastepaper and other fibers.

Total woodpulp consumption is projected to hit 183 million tons in 1995, up from 125 million tons in 1981, with Canada, Japan, the U.S.S.R., Finland and Sweden the largest producers and consumers. Consumption is seen up 3.1%/year in the 1981-85 period and 2.6%/year from 1985 to 1995 vs a historic rate of 2.3%.

The European Economic Community will face the most serious pulp production deficit due to insufficient timber resources, and it will become increasingly dependent on Canadian and Scandinavian imports. Brazil and the U.S.S.R. will join these countries as major exporters, although intensifying eastern European pulp requirements will prevent the U.S.S.R. from playing a major role in world markets. Pulp demand will escalate most rapidly in the developing countries of Latin America, Africa, and Asia, which lack the means to exploit their large timber resources due to transportation, infrastructure and capital supply problems, according to *World Woodpulp & Other Fibrous Materials*.

Wastepaper growth. Wastepaper consumption is projected to rise from 48.7 million tons in 1981 to 88.2 million tons in 1995, accounting for 30.6% of total fiber consumption compared to 26.5% in 1981. Improved recovery techniques and a shortage of indigenous forest resources will spur wastepaper recovery and consumption through 1995, particularly in Japan and the EEC.

World Cellulose Fibrous Pulp Supply & Demand
(000 metric tons)

	1981	1985	1995
Paper & board production	172,241	200,880	282,000
Fiber/p&b output (ratio)	1.06	1.05	1.02
Total fiber consumption	183,324	211,120	288,490
Woodpulp consumption	124,928	141,060	182,850
% of total fiber	68.1	66.8	63.4
Wastepaper consumption	48,659	58,190	88,225
& of total fiber	26.5	27.6	30.6
Other fiber consumption	9,737	11,870	17,415
% of total fiber	5.3	5.6	6.0

Source: Predicasts Inc.

EXPORTS

EEC resumes newsprint quota talks . . .

Negotiations resumed on Sept. 27-28 in Ottawa, Ont., on proposed cuts in the level of tariff-free newsprint allowed into European Economic Community countries from non-EEC suppliers (*P&P*, Oct., p. 33).

This latest set of meetings between Canadian and EEC officials was not expected to produce any final results, said a Canadian official. Although the EEC's Jan. 1, 1984 deadline for implementing the proposed changes is nearing, talks were expected to last at least several weeks, he said.

The EEC wants to reduce the quota—presently 1.5 million metric tons—next Jan. 1 because that is when the duty on Scandinavian newsprint will be eliminated. Canada and Scandinavia are the principal suppliers of newsprint to Europe from outside the EEC.

. . . and pulp price-fixing talks

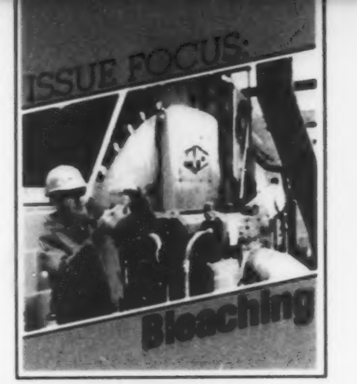
Meetings with some companies involved in the European Economic Community's investigation of alleged pulp price-fixing began early in September as the EEC resumed operations following its month-long holiday, observers said.

The meetings, which relate to a long-standing investigation into an alleged cartel involving 57 producers worldwide—including the U.S. and Canada—were said to be informal gatherings to discuss documents already submitted by the companies. Similiar meetings were held earlier this summer, said one official.

The EEC continues to request records on the companies' European pulp sales activities going back to 1974, observers said. The investigation appears to have nearly stalled, however, with little progress having been made, say officials.

The meetings and requests for additional data are likely to continue, said one company executive who expects to be asked for additional information within a short time. Companies generally feel a settlement in the near-term appears unlikely, and many suspect the EEC may be overwhelmed with documentation.

An EEC proposal made this spring for a possible settlement of the case has received mixed response from the companies, observers said. The EEC's plan involved changing the currency of exchange from the U.S. dollar in most cases. Nonintegrated producers could sell in either the currency of the buyer or the seller, however (*P&P*, June, p. 35).



Chemical pulp bleaching: survey of U.S. bleach plant operations

Pulp & Paper's exclusive survey of bleach plants covers data on chemical use, inroads of new technology, trends in bleach plant operation

By MICHAEL J. DUCEY

TABLE 1: **Breakdown of mills and bleach plants surveyed, grouped geographically and by process specifications.**

Total bleach plant lines	83
Total tonnage	15,704,000
Total bleached U.S. capacity	22,000,000
Capacity represented by survey (%)	71.4
Geographic distribution	
Region	**Number**
South	48
Northeast	14
West	8
Midwest	11
Process distribution	
Species processed	**Number of lines reporting**
Hardwood	46
Softwood	52
Blends	10
Number of stages in sequence	
3	12
4	26
5	35
6	15
End product	
Market pulp	51
Fine paper	28
Tissue	7
Paperboard	10
Bleached pulp capacity (tpd)	
700 and over	20
400 to 700	25
Below 700	29

Note: Some bleach plants may be counted more than once and thus add up to more than 83, since some mills produce more than one bleached grade—for example, both hardwood and softwood, using different sequences at the same site.

▪ This article presents the results of an exclusive *Pulp & Paper* survey of bleached chemical pulp mills in the U.S. covering many aspects of bleach plant operations.

P&P began the survey in November 1982 by sending a detailed survey questionnaire to each bleached mill in the U.S. The survey form asked for bleach plant operating data (sequence, species, pulp, tpd, brightness, and end-use) and chemical usage within each sequence in lb/ton of pulp. As of mid-August, nearly 70% of all bleached chemical pulp produced, or about 15 million short tons, was accounted for (see Table 1).

This tonnage consists of bleached pulp processed by 83 bleach plant lines with a heavy concentration in the South. The capacity represented by the individual mill operations is spread relatively evenly, with 27% of the mills producing 700 tpd or more, 33% producing from 400 to 700 tpd, and 39% producing less than 400 tpd.

The majority of the mills responding to the survey produce market pulp, fine paper, and bleached board. A few mills also produce tissue grades. Mills producing bleached paperboard grades are well represented, but the percentage of the total tonnage responding to the survey in this grade is less than that represented by market pulp and fine paper producers who responded.

American Paper Institute capacity data for 1982 show that 21,119,000 tons of bleached/semibleached kraft and 1,372 tons of bleached sulfite, or a total of 22,491,000 tpd of capacity, are in place.

As a follow-up to the mailing, a telephone survey was conducted of all pulp mills in the U.S. More than 80 different locations provided detailed operating data, plans for expansion/modernization, areas that each particular mill was working on, and confidential information on the implementation of new technology. Only a few mills refused to release or verify any data on their operations. Some mills felt that their chemical usage data could be used by competitors to analyze cost structures, but in most cases these mills verified general trends and average usage on a chemical-by-chemical basis. As a result, the survey represents a very high per-

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centage of operating bleach plants in the U.S.

In most cases, chemical usage data presented here for each chemical indicate actual bleaching consumption. Although in some cases mills reported total chlorine use on a lb/ton pulp basis, including chlorine use for hypochlorite makeup, the chlorine-use data given here does not include that portion. Caustic soda was handled in a similar manner.

All survey information and data were processed using a personal computer for statistical analysis. Average chemical usage data in lb chemical/ton pulp are presented on a national and regional basis in Table 2.

Table 3 is a breakdown of chemical use segregated by intended end-use of the pulp. As noted above, the tonnage represented by board and tissue mills is less than 50% of total capacity for these grades. However, several producers who hesitated to release actual data confirmed that their average usage data was in most cases very similar to that reported by mills producing similar grades and using similar sequences.

Table 4 is a comparison of chemical use by the bleaching sequence employed.

In addition to gathering specific operating data covering chemical use, the survey also gathered information on mill expansions, new processes, etc. These findings are discussed below.

OXIDATIVE EXTRACTION. One new process receiving very strong interest at the mill level is oxidative extraction (E_O), which involves adding oxygen gas to the normal caustic extraction stage. About 30 mills reported that they are actively looking at installing this technology. Twenty-five mills indicated that they are currently investigating the use of oxygen on a laboratory/pilot basis, with a number planning to go online in 1984 if results are as anticipated and cost can be justified. The exact number of mills going with this process will be determined by how well certain limitations perceived by mill personnel are overcome. Cost justification of new equipment, particularly mixers, and determination of the best operating conditions, such as retention time, mixing techniques, etc., need to be resolved.

However, it is likely that a number of installations will be operating by the end of 1984. The main basis on which most E_O installations are justified is chemical cost savings, particularly of chlorine dioxide. However, data from initial installations indicate that chlorine and caustic use can also be adjusted and/or reduced.

Three methods of using oxygen with an extraction stage are currently online. The difference between these involve capital costs, mixing technique, and location of oxygen injection. The first method involves capital expenditure of between $100,000 and $500,000, depending on the existing system and the required results. This cost range covers mainly only the oxygen supply equipment on the low end and generally includes a mixer, thick stock pump, etc., on the high end.

In the first method—an upflow system—oxygen is injected with the pulp at a high-shear, medium-consistency mixer between the thick stock pump and the E_1 tower. Good mixing is required for uniform quality. Suppliers say that this mixing is necessary to avoid bubble coalescence, which causes channeling. In a downflow tower system an upflow retention tube is needed.

An upflow tube/downflow tower method is now online at Consolidated Papers Inc. in Wisconsin Rapids, Wis. The system is designed to handle around 425 tpd, the mill's entire output, and was brought online in September 1982. The system uses an Impco high-shear mixer and an Air Products & Chemicals oxygen supply system. A $2/ton savings in chemical cost, resulting in a one-year payback, has been reported by mill personnel. Some concern regarding fiber damage using the high-shear method has been voiced; however, the mills contacted have not experienced this. Other mills have installed high-shear E_O systems, including several Swedish mills and a Japanese mill. Also, sources indicate that another unidentified U.S. mill is currently operating this system.

The second method, online in two Japanese mills and one Canadian mill, involves a similar injection technique with a static mixer. Several sources indicate that low capital cost is one advantage of the static mixer.

The third method, now undergoing tests at more than a half dozen mills across the U.S., costs around $10,000. The O_2 is injected at the E_1 stage near the nozzles in the dilution zone of the tower. Additional mixing equipment, a high-cost item, is not necessary. Mixed reviews on this process have been reported. Some mills indicated problems resulting from improperly dissolved oxygen, but work on this method continues.

The O_2 addition rate varies with species, production rate, and method used, but generally falls between 6 to 10 lb/ton pulp on softwood and 4 to 6 lb/ton on hardwood. Addition rates in excess of about 15 lb/ton are seen as a limit. Retention times depend on production rate, but tests using 5 to 10 min with no real upper limit have proven effective. The Japanese mills using static mixing from Systematic report a 1:1.5 substitution of oxygen for chlorine dioxide. Final brightness is increased by a point or two using both mixing methods.

Reportedly, one side benefit of E_O is effluent reduction [biological oxygen demand (BOD), chemical oxygen demand (COD), color, and total suspended solids (TSS)] but no particular system to date has been shown better than others, and limited data are available. An added potential benefit could be obtained by lowering the amount of chlorine-containing chemical used; chlorine-containing organic compounds in the effluent should be reduced.

TABLE 2: **Average chemical usage data grouped geographically for comparison (lb/chemical ton pulp).**

	National		Regional							
			Northeast		South		West		Midwest	
Chemical	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**
Chlorine	115.9	90.4	130.7	75.3	116.6	78.4	115.4	N/A	N/A	98.3
Chlorine dioxide	20.6	19.3	15.5	13.4	24.2	20.3	20.3	N/A	N/A	18.3
Sodium hydroxide	82.7	69.5	56.5	45.4	86.8	65.6	99.4	N/A	N/A	83.3
Hypochlorite	45.0	36.6	51.3	33.9	38.5	28.2	88.4	N/A	N/A	54.7

CHLORINE DIOXIDE SUBSTITUTION. The large majority of U.S. mills surveyed that practice chlorine dioxide substitution in the chlorination stage have not moved toward higher levels (i.e., 40% to 70% substitution) despite the supposed advantages of doing so. Most mills feel that the lower levels (10% to 20%) are best since the primary goal of substitution is protection against viscosity loss. However, a handful of mills operate at levels of 20 to 30 lb/ton of ClO_2 in the C stage. The mills using lower levels generally report they see no advantage to the higher levels; although much published data indicate benefits through reduced chlorinated-compound-containing effluents. Around half the mills surveyed reported using ClO_2 in the C stage. These mills produce pulps for market and captive use, and for a variety of end-uses, including market pulp, solid bleached sulfate board grades, fine paper, and tissue.

DISPLACEMENT BLEACHING. Displacement bleaching, which was introduced to the U.S. by Kamyr in 1975 at Temple-Eastex Inc., has become more widely accepted recently with two new U.S. installations within the past year, bringing the total to four. The process technology has matured, and lower capital costs and equivalent chemical costs compared with a new five-stage conventional installation are now reported. Mechanical reliability has also reportedly improved, as the two original U.S. installations report no major shutdowns or problems. Worldwide displacement bleaching has grown tremendously, and recent modifications of the operation have proved successful.

The latest design reportedly requires more capital and space than earlier displacement versions, but offers brightness improvements. Medium-consistency chlorination using two-stage, high-shear mixing begins the process outside the tower. Chlorine dioxide and chlorine are injected into the first mixer (150 hp) perpendicular to the feedstock. The mixture is "twisted" into the second mixer, then pumped (by a thick stock pump) into the bottom of the tower. The pulp travels up through a series of displacement zones. Each zone has three steps: an initial dynamic period when chemical is absorbed into the pulp, a static period when fiber travels up to the next zone, and another dynamic period when liquid is displaced out of the suspension with washwater or liquid from the next zone in the sequence.

The production capability is determined largely by the size of the tower, usually associated with the number of concentric diffusion screens (or rings) constructed around a central rotating shaft. After the pulp from the displacement stage passes through a diffusion washer, it is taken to a conventional final D2 tower for three hours or so of retention. This design reportedly offers market pulp producers 90+ brightness capabilities and improved brightness stability.

Kamyr has also tested a larger tower, composed of a unit with seven rings which are 20 in. apart, that pushes production over 2,000 tpd. The two new American mills have smaller systems, according to industry sources. International Paper's mill at Georgetown, S.C., will operate a six-ring unit with production targeted at 1,220 tpd; however, ultimate capacity of this unit has been estimated at closer to 2,000 tpd. The new bleach plant will make Georgetown one of the largest bleached chemical pulp mills in the world. Crown Zellerbach at Camas, Wash., plans production with a five-ring unit at 800 tpd, expanding mill capacity there significantly. This system should be online in 1983. The latest order is from a 600-tpd mill in Japan.

The implementation of other new technology in conjunction with this system in Europe has already proved cost-effective. One method used in three mills is oxidative extraction. With a special nozzle, oxygen is introduced into the pulp close to the central shaft in the E1 mixing zone. When 5 to 7 lb/a.d. ton of oxygen are used, up to $2/ton can be saved in chemical costs. Problems can arise when oxygen bubbles recombine, but sources report that proper turbulence in the mixing zone ensures consistent pulp quality.

Displacement has always offered potentially large savings in energy costs and significant pollution reduction. With seven systems ordered in one year, it appears that displacement is headed for wide acceptance as the technology matures.

OXYGEN SYSTEMS. Giving displacement bleaching competition for new installations that deviate from conventional bleach plant technology are short-sequence processes that incorporate oxygen delignification. Other than those two relatively new processes, tests using alternate chemicals for short sequences (mainly ozone and peroxide) and other methods involving mixing in pipes and abbreviated retention times have been conducted. Much data have been published, but to date no commercial success has been achieved.

To date, three U.S. mills operate oxygen delignification systems, all of them at high consistency. The first was brought online at Chesapeake Corp. of Virginia's West Point, Va., mill in 1973, using an Impco system operating at 400 tpd. It was not until seven years later in

TABLE 3: **Average chemical usage segregated by end use of the pulp (lb/chemical ton pulp).**

	End-use of pulp					
	Market pulp		Fine paper			
Chemical	**Softwood**	**Hardwood**	**Softwood**	**Hardwood**	**Paperboard**[1]	**Tissue**[1]
Chlorine	99.4	72.9	120.5	92.7	120.6	90.0
Chlorine dioxide	25.5	21.9	17.5	16.1	15.6	12.3
Sodium hydroxide	74.8	62.8	81.1	69.2	84.9	57.5
Hypochlorite	29.1	25.8	53.5	41.7	54.5	34.3

1. Less than 50% of API capacity is actually represented based on data received from mills responding to the survey.

TABLE 4: **Comparison of chemical use by bleaching sequence used (lb/chemical ton pulp).**

	Sequence			
Chemical	**CEDED**	**CEHED**	**CEHDED**	**CEDH**
Chlorine	102.1	105.0	114.0	96.3
Chlorine dioxide	26.2	15.9	26.0	14.3
Sodium hypochlorite	79.8	86.2	87.2	48.5
Hypochlorite	—	36.7	36.0	32.0

Note: This breakdown does not consider end-use or final brightness and thus is not meant to be absolute.

1980 that Buckeye Cellulose brought a 1,000-tpd (design) Kamyr system online. The most recent startup was Union Camp's Franklin, Va., mill, with an Impco/Modo Chemetics system. Union Camp is also planning to install a similar system at its greenfield white pulp and paper complex in Eastover, S.C. In addition, various industry sources confirmed that at least one company is in the decision-making period regarding a new oxygen delignification system at an existing mill. Others are investigating these systems on a more preliminary basis.

The short-sequence process is typically three or four stages with the initial oxygen stage, primarily as a continuation of the pulping process. The stock is fed from the digester through a series of screens and washers to a press that prepares the pulp for high-consistency (28% to 33%) bleaching in an oxygen reactor. A thick-stock pump or screw feeder moves the stock to a fluffer on the top of the reactor, where it is dispersed evenly on the pulp bed. Steam can be applied here or with a steam mixer, depending on the particular system involved. Gaseous oxygen is injected into the bottom of the tower and moves through the pulp. After a 30- to 40-min retention, the pulp is diluted in the last reactor zone. Exit kappa number is about 10 for hardwood and 15 for softwood—about half of what it would be after a conventional C stage. The diluted pulp is blown into a tank for 20 to 30 min with agitation to remove entrained air. Two-stage washing then prepares the pulp for conventional bleaching in later stages. The spent liquor from the oxygen bleached pulp is sent to the kraft recovery system. The O_2 delignification reduces the bleach load on the later stages, due to its increased delignification, and results in chemical usage 25% to 35% lower than conventional sequences. Other major benefits reported are reduced BOD, COD, and TSS, all of which are reduced in excess of 50%. Energy consumption for oxygen systems seems to vary depending on exact conditions, and no conclusions were drawn from the survey.

The use of an O_2 stage to replace an existing intermediate stage such as hypochlorite is also in commercial use. The benefits are similar, but difficulty in installation can be encountered if space is a problem. However, one mill operates a full-scale system very successfully. Oxygen charges in all systems are typically between 27 to 35 lb/ton, and savings in chemical costs are reported close to $3/ton.

The relatively high cost of an oxygen system has historically been the major deterrent because the dewatering equipment raises the capital cost very high compared with a conventional bleach plant. On the positive side, the large decrease in bleach plant effluent favors oxygen in greenfield mills and in mills contemplating expansions where the effluent treatment system is running at capacity. In greenfield mills a smaller than normal treatment system can be installed, thus saving substantial amounts of capital in this area, which can be traded against the oxygen system's cost. In existing mills, expansion is possible while not increasing BOD, etc., as much as in a conventional bleaching operation, allowing mills to stay within effluent discharge limitations. Other benefits include heat value from the filtrate sent to the recovery system, provided the evaporator/recovery boiler can handle the additional load.

Almost all oxygen bleached tonnage is produced using high-consistency systems (20% to 32%). However, since the equipment to obtain this consistency is a major capital item, significant work has been done to develop systems functional at low- to mid-consistency. Work is underway with one commercial operation in Europe using an oxygen system that handles pulp at continuous digester blow consistency (mid-range). In addition, a number of proposals for low-consistency systems have been made, but to date there are no mills using these.

Various technologies using oxygen are naturally continuing to converge. Some installations have an oxygen reactor and oxidative extraction in the subsequent stages. The Norrsundet mill in Sweden is using a $(C\&D)_oD$ sequence supplied by Sunds for production of softwood kraft market pulp with a brightness of 86% to 87% ISO.

PEROXIDE SUBSTITUTION. The application of peroxide to the bleaching sequence has been reported in an estimated two dozen mills (mostly southern market pulp producers) since the beginning of last year. One reason may be its flexibility. Peroxide can be used in different stages for different reasons, with reportedly a very high return on investment.

Another justification is price. Peroxide has always been a costly chemical. However, when the energy crunch hit, the cost of ClO_2 generated onsite using sodium chlorate (another energy-intense chemical) skyrocketed at a rate higher than inflation, making ClO_2 increasingly expensive relative to other chemicals. As a result, peroxide became more attractive. Generation of peroxide has also become more efficient, which should help to further stabilize price.

The methods for H_2O_2 substitution are fairly simple and involve relatively low capital costs. Mills surveyed that use peroxide were most impressed with its application in the E_2 stage. Peroxide is added at the repulper or with a mixer to the pulp leaving the D_1 washer. The pulp is then fed to the E_2 storage, where the temperature is reduced 10° to 20° (proportional to retention time), resulting in reduced energy consumption. Mills report that chemical costs are significantly lowered. Peroxide can save ClO_2 on a 2:1 ratio and also reduces caustic use in the E_2 and buffer in other stages. Typical savings for peroxide substitution are reportedly between $3 and $4/ton pulp.

Capital investment is in the $100,000 range, which covers a storage tank for the peroxide solution, a metering device, thick-stock pump, a mixer (optional), and piping. A similar configuration is needed for peroxide application in the E_1, but reportedly is used for different reasons. Peroxide is injected with NaOH into the pulp, typically below 1% by weight of pulp. The substitution has little bleaching effect on the pulp, but can cut effluent in half since nearly 80% of all color is removed in the E_1. This small H_2O_2 addition helps oxidize this material before it is sewered. Some bleaching effect is possible since peroxide can delignify the pulp, and reducing caustic in the E_1 keeps quality consistent. Finally, peroxide can also aid in quality improvements when added in a terminal application. A 1% addition as the pulp exits the final stage enroute to the HD tower can improve brightness, brightness stability, and strength.

Peroxide is a flexible chemical and is price-stable. As with oxygen, it too has potential in short-sequence operations and other future technology.

RECENT MAJOR INSTALLATIONS. One very interesting finding of this survey is that the two newest greenfield mills in the U.S. plan to install conventional, five-stage bleach plants. Champion International Corp.'s Quinnesec, Mich., facility is reportedly installing a CEDED sequence. Great Northern Nekoosa's Leaf River Forest Products market pulp mill in New Augusta, Miss., has also ordered a CEDED bleach plant. Significantly, neither mill opted for either oxygen delignification or displacement technology. The last greenfield bleached pulp mill brought online in the U.S. was the Buckeye Cellulose mill in Oglethorpe, Ga., which installed a 1,000-tpd Kamyr oxygen system.

WASHING. The two types of bleach plant washers, vacuum drum and diffusion, have been in stiff competition in new bleach plant installations. During the past five years industry sources report that total installations are split fairly evenly between the two methods.

For mills having problems with washing efficiency and not planning any major modernization projects, one method reported by several mills to be quite successful in improving washer operation is the use of Uniflow showers, marketed since 1980 by Comarco Industrials. One Uniflow shower can replace two weir or two whistle showers at a capital cost of $8,000 to $10,000 and results in benefits in energy and chemical savings.

The showers are two-compartment units with U-shaped, perforated flow distributors located in the upper compartment, with flow rate a function of inlet pressure, hole size, and spacing. The lower section maintains an 8-in. hydraulic head over the low-velocity discharging wash solution, using two flexible seals that ride the rotating pulp mat at an adjustable contact angle. Shower flow and press roll loading are balanced for the best combination of off-washer consistency and chemical carry-over. The hot shower water applied to the mat promotes maximum heat transfer, reducing steam costs in later stages.

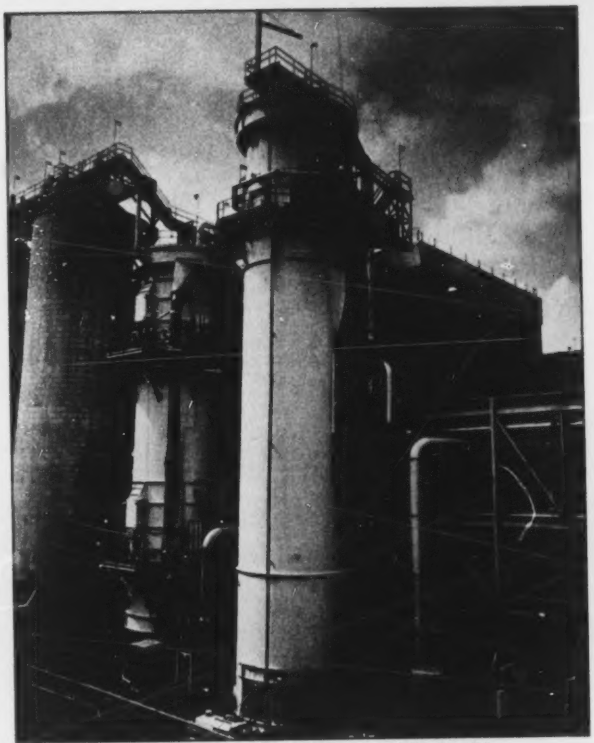
The diffusion washer has been accepted more widely with the great popularity of continuous digesters. Mills ordering new digester equipment have ordered diffusers for brownstock washing because they are reported to be simple to operate and energy efficient.

In a diffusion washer, wash liquor is injected at the center of each ring. The solid-titanium vessel extracts wash liquor from a number of concentric diffusion screens or rings. These rings move vertically, picking up plugged stock and wiping it off the screen with a rapid downstroke. A rotating scraper at the top moves the pulp to the next operation (either another diffusion stage or out-of-tower).

A number of mills reported experimenting with recycling filtrates, hot chemical additions, and other techniques to alleviate effluent problems. Design and installation are usually done in-house by mill staff, and methods vary depending on each particular case.

Filtrate recycling through washers is popular. The filtrates are collected and pumped into the suction of the previous or next washer for prebleaching the pulp and for pH stabilization. Some piping, pumps, and storage tanks are typically all that are required. Reduction in effluent, freshwater and chemicals are the chief benefits.

Problems can develop, especially when elevated temperatures are involved. Chlorine and chlorine-containing compounds are very corrosive and play havoc on unprotected equipment. Modification of equipment using FRP or similar anticorrosive material is essential. One limitation on recycling in mills using ClO_2 is the material of construction in the bleach plant, which is particularly a problem in older mills.



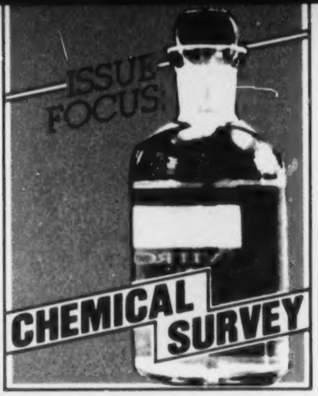
Displacement bleaching tower at Crown Zellerbach's Camas, Wash., mill.

BLEACH PLANT MODERNIZATION. The survey found that since 1980, sensors, controls, and full-control systems have been installed in many mills in the U.S. Bleach plant control gives a new look to the existing facility while paying for itself in chemical reduction, quality, consistency, and increased brightness.

To modernize the bleach plant, preliminary decisions on where and how much control is needed and capital available are necessary. Before any purchase is made, a thorough evaluation of variables associated with the proposed controls and the three principles of the bleaching process (mixing, retention, and washing) in each stage should be made.

If a full control system was installed, capital costs were reported ranging from $500,000 to $1 million including systems hardware (CPU, operator interface, color videos, printers, etc.), control software, sensors, cables, startup and training. One supplier estimated that 30% to 40% of all mill bleach plants now are fully controlled.

The major interest in process control was expressed in chlorination-stage control, particularly on a trial basis and in cases where mills had limited available capital. Equipment necessary includes sensors for brightness and chemical demand and controls for flow rates of all feed lines, pH, and consistency. Price range for these packages was reported to fall between $80,000 and $150,000, depending on the application. The sensors fit easily on a feed pipe located 15 to 60 sec after chemical injection and after the retention tower. Maintenance on the optical brighness sensors was said to be low, but higher on the residual chemical demand sensors. ■



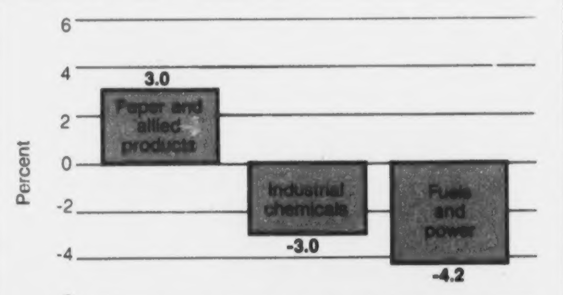
Pulp/paper chemical use, prices to strengthen slowly in 1983-84

Pulp & Paper's annual chemical survey forecasts good availability and only moderate price firming as the paper industry pulls out of recession

By BARRY SHOCKETT

■ Although most areas of the U.S. pulp and paper industry have improved somewhat from the 1982 recession, chemical demand by mills has not recovered to the same extent. Discounting has continued in some cases, although not at the same level that prevailed in 1982. The year-to-year wholesale price index for July 1983 (see Figure 1) was off again, but the decrease was less than the 5.5% reported in July 1982. On the other hand, the fuels and power index was down in the seventh month this year from 701.1 to 671.6, reflecting lower crude and natural gas prices. Nevertheless, petrochemical feedstock prices began to move up in 1983, but will probably not reach last year's list-price levels much before the second quarter in 1984. Thus, price hikes for petrochemical-based mill chemicals have not been as high as expected.

FIGURE 1: **U.S. price index changes for 1983*.**



* Only the paper and allied products index continued to experience a year-to-year increase during the first seven months of 1983.
Source: Wholesale price indexes, Bureau of Labor Statistics.

An expected increase in coated paper output of between 8% and 10% in 1983 should result in greater demand for coating materials, including starch and styrene-butadiene and other latexes, as well as kaolin and titanium dioxide. By mid-September, paper and paperboard production were up 6% and 7.6%, respectively.

By the end of May 1983, total woodpulp production was only 2% ahead of last year. However, output of market pulp during the first five months of this year was about 6% ahead of year ago. If this rate is maintained throughout 1983, increases in the order of 5% to 7% can be expected in mill usage of larger-volume chemicals such as sodium chlorate, soda ash, chlorine and caustic.

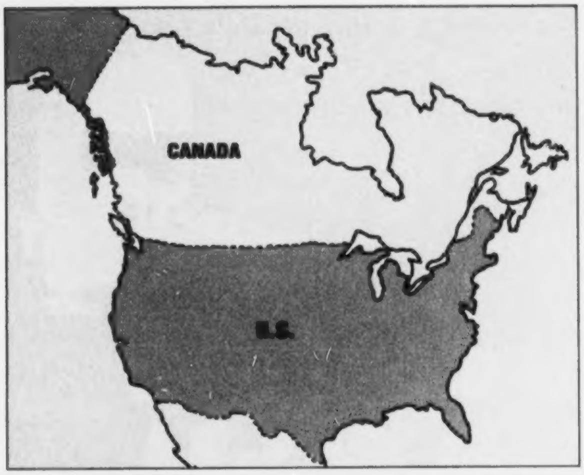
Until early last year, caustic was in a tight situation, while chlorine demand was down. However, chlorine is usually the first of the coproducts to be affected by a recession and also the first to recover (by at least six months). Significant improvement in the construction and automotive industries this year has led to a 12% boost in polyvinyl chloride (PVC) demand, which in turn has sparked consumption of precursor chlorine. By mid-1983, chlorine output was running ahead of last year, between 8% and 9%.

The Chlorine Institute reported that operating rates in June had dropped marginally to 68.8% (from 70.7% in the previous month), although they were still higher than the 64.8% rate in the year-ago month. However, excluding the mothballed plants, actual operating levels were reportedly between 75% and 80%.

Ironically, the surge in chlorine demand has exacerbated caustic's oversupply, a situation which is not expected to improve until the worldwide economic recovery catches up to the U.S. There were signs, however, that caustic exports were beginning to turn around from last year's sharp drop to 810,000 tons (down almost 40% from 1981). At end of July, shipments out of the country were at the 1-million-ton mark on an annualized basis.

With fertilizer demand still depressed in 1983, sulfur supply remained adequate, although mill usage increased about 8%. Despite the decrease in total elemental sulfur output—by the end of July it was down 9%—recovered sulfur's share increased again to 60.5% as Frasch output dropped for the second year in a row. However, domestic shipments rose in the first seven months, resulting in an inventory reduction of almost 500,000 metric tons from that reported at end-1982.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.



CHEMICALS: U.S.

DEFINITIONS OF SURVEY AVAILABILITY TERMS:

Very tight—On allocation or demand significantly greater than supply.
Tight—Demand slightly greater than supply.
Market—Supply/demand in balance, or excess capacity available.

Calcium carbonate

Uses: About 85% of the calcium carbonate ($CaCO_3$) used in the paper industry is for coating, with the balance employed as filler. Precipitated grades are used in about 70% of the applications, but ground natural carbonate continues to find increased usage as finer grades are introduced.

Demand: In 1982, the paper industry consumed an estimated 145,000 tons of $CaCO_3$. With industry output up over 6% for the first seven months of 1983, carbonate consumption by the mills should rise to about 154,000 tons in 1983. Other major end-uses include plastics, coatings, and refractories.

Sources: Producers are listed in *Pulp & Paper Buyers Guide 1982*, "Register of coating and filler pigments" (p. 32).

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: Precipitated: 1983, \$170-\$180/ton, bulk, f.o.b. works; 1982, \$160-\$170/ton; 1981, \$95-\$160/ton; 1980, \$105-\$135/ton; 1979, \$98-\$123/ton; 1978, \$95-\$133/ton. Medium-ground (15-micron): 1983, \$108-\$116/ton, bags, truckload, f.o.b. works; 1982, \$105-\$108/ton; 1981, \$95-\$100/ton; 1980, \$90-\$95/ton; 1979, \$82-\$83/ton; 1978, \$66-\$76/ton.

Forecast: Precipitated carbonate prices rose about 6% in 1983 and should experience a similar boost next year. Medium-ground $CaCO_3$, on the other hand, increased about 8% in price and is expected to go up between 7% and 8% in 1984.

Caustic soda

Uses: Most of the caustic soda (sodium hydroxide) consumed by the pulp and paper industry is used by kraft and bleached sulfite mills, mainly for caustic extraction in the bleach plant. Kraft and semichemical (NSSC) mills also employ some caustic for sodium oxide makeup.

Demand: Pulp mills in 1982 consumed an estimated 1.7 million tons of sodium hydroxide, between 17% and 18% of the 9.8 million tons produced. Mill consumption in 1983 is predicted to be up about 6% to 1.8 million tons, as total caustic production this year is forecast at about 10.7 million tons. Organic and inorganic chemicals together used over 50% of the total; textiles and aluminum processing each account for about 6%.

Sources: Caustic soda is a coproduct of chlorine production. See the chlorine profile for major producers.

Availability: 1983, market; 1982, tight to market; 1981, very tight to tight; 1980, very tight; 1979, market; 1978, market.

Pricing: 1983, \$265-150/ton, 50% solution, f.o.b. works, freight equalized; 1982, \$315-\$285/ton; 1981, \$270-\$320/ton; 1980, \$167-\$200/ton; 1979, \$130-\$160/ton; 1978, \$160-\$170/ton.

Forecast: The increased availability of caustic, because of the surge in chlorine demand (q.v.), in the face of depressed demand for the alkali has resulted in sharp drops in caustic prices (see Pricing). In fact, spot prices for export on the Gulf Coast reportedly dropped to as low as \$50/metric ton. However, by the end of the third quarter, there were signs that caustic prices had bottomed out and would begin to increase slowly in 1984. The most recent export quote had risen to \$75/metric ton, and some producers were offering product to domestic customers at more than \$160/ton. Significant price hikes are expected in the latter part of 1984—probably around 20% to 25%—but a return to the lists prevailing in early 1982 will not take place until the second half of this decade.

Chlorine

Uses: The major end-uses for chlorine in the pulp and paper industry is as a bleaching agent in both kraft and sulfite pulp mills. Small quantities of chlorine are also employed for onsite manufacture of calcium, or sodium hypochlorite used to bleach chemical or mechanical pulps.

Demand: In 1982, chlorine demand by the pulp and paper industry was an estimated 1.2 million tons, about 13% of the total demand of 9.1 million tons. In 1983, mill consumption is expected to be about 1.3 million tons. Other major end-uses include ethylene dichloride (EDC)—the intermediate for vinyl chloride monomer (VCM) manufacture—inorganic and organic chemicals, and municipal and industrial water treatment. EDC accounts for about 22% of the total.

Sources: Approximately 25 companies in the U.S. make chlorine and caustic together by the electrolytic reduction of brine. (Relatively small quantities of chlorine are also produced by oxidation or electrolysis of hydrochloric acid). The major chloralkali producers (in decreasing order of nameplate capacity) include: Dow Chemical, PPG Industries, Diamond Shamrock, Olin, Occidental Chemicals, Vulcan Materials, Georgia-Pacific, Convent Chemical, and Pennwalt. Dow's Midland facility is still closed (since June 1982) but may be reopened next year. Other producers with several plants are also rationalizing, although one producer expects to add an additional 100,000 tpy by year-end.

Availability: 1983, market to slightly tight; 1982, market; 1981, market; 1980, market; 1979, tight to very tight; 1978, market.

Pricing: 1983, \$145-\$180/ton, f.o.b. works, freight equalized; 1982, \$145/ton; 1981, \$145/ton; 1980, \$145/ton; 1979, \$135-150/ton; 1978, \$135-\$145/ton.

Forecast: As predicted last year (see *P&P*, November 1982, p. 56), the first \$20/ton boost in chlorine's off-schedule prices in September 1982 (after five previously unsuccessful attempts) has led to four consecutive quarterly increases in the selling price. Approximately \$100 has been added to the depressed prices of early 1982. There may be further hikes for chlorine, but the rate of increase will slow down, particularly if caustic prices begin to move up as the improvement in world economy catches up to the U.S. recovery. Despite the increase in chlorine, however, the ECU value has actually gone down because of the sharp drop in caustic (q.v.). Currently, posted chlorine prices vary with producer and shipping point from \$145-\$180/ton, although one producer is listing at \$150/ton at all its plants. Although over the long term chlorine usage by pulp mills will decrease gradually under pressure of continued ClO_2 substitution, demand in 1984 is expected to return to the 1981 consumption level of 1.4 million tons.

Hydrogen peroxide

Uses: Hydrogen peroxide (H_2O_2) is traditionally used in the pulp and paper industry primarily as a bleaching agent for chemical and mechanical pulps. It is also employed in the deinking of recycled newsprint.

Demand: In 1982, the pulp and paper industry used an estimated 13,500 tons, about 13% of total consumption (102,000 tons). Peroxide's major end-use is as a chemical intermediate, accounting for between 25% and 30% of total demand. Other applications include textiles, municipal water and waste treatment, industrial effluent treatment, and uranium mining.

Sources: The three remaining H_2O_2 producers, in descending order of capacity, are: FMC, E.I. DuPont, and Interox. Interox acquired PPG's Ohio plant late in 1982 and subsequently closed it early this year, while FMC shut down its small Washington unit in the second quarter of 1983.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: 1983, 43¢/lb, 70% solution, f.o.b. producing point, freight equalized; 1982, 39.5¢/lb; 1981, 35.6¢-39.5¢/lb; 1980, 35.5¢-36.5¢/lb; 1979, 32.5¢/lb; 1978, 28¢/lb.

Forecast: Despite a decrease in apparent consumption to 101,000 tons in 1983, pulp and paper industry usage is expected to increase to 15,000 tons. Increased H_2O_2 usage by kraft mills (in the E-2 stage) and continued growth in mechanical pulping should result in an annual 10% growth in industry demand over the next few years. Although some customers resisted the 43¢/lb price instituted at the beginning of 1983, the list has since firmed and is not expected to increase again until the second quarter of 1984.

Kaolin clay

Uses: Kaolin clays are employed in a wide range of paper and board grades as both filler and coating pigment. Coating applications account for about 54% of industry usage.

Demand: In 1982, an estimated 2.9 million tons of kaolin were used by the paper industry, about 74% of total kaolin consumption. In 1983, mill usage is expected to return to the 1981 level, when about 3 million tons were required. Approximate usage by grades: Nos. 1 and 2, 24%; water-washed, 22%; Nos. 3 and 4, 16%; delaminated, 13%; high-brightness and air-float, 10% each; and other, 5%. The next largest end-use is by the ceramics industry (20%), with the remaining 6% accounted for by paints, rubber, refractories, etc.

Sources: Producers are listed in *Pulp & Paper Buyers Guide 1982*, "Register of coating and filler pigments" (p. 32).

Availability: 1983, market; 1982, market; 1980, market; 1979, market to tight.

Pricing: Premium No. 1 coating: 1983, $155/ton, f.o.b. Georgia; 1982, $142/ton; 1981, $130/ton; 1980, $84/ton; 1979, $108/ton; 1978, $98/ton. Water-washed, No. 1 coating: 1983, $108.65 (same basis); 1982, $99.50/ton; 1981, $91.50/ton; 1980, $84/ton; 1979, $76/ton; 1978, $61.50/ton. Dry-ground, filler grade: 1983, $61/ton (same basis); 1982, $61/ton; 1981, $56/ton; 1980, $51/ton; 1979, $35-$44/ton; 1978, $30-$35/ton.

Forecast: Kaolin usage should recover this year as paper and paperboard output was up about 6% by the end of July (compared with the seven-month period in 1982). Continued growth of the industry in 1984 could result in another 100,000- to 200,000-ton boost in consumption next year.

Lime

Uses: The kraft mill operator requires a low-cost alkali to causticize the sodium carbonate in the green liquor. Lime is the cheapest alkali available (between 2¢ and 3¢/lb), and therefore is basic to the soda/lime route to free caustic. Kraft mills produce reburned lime onsite.

Demand: In 1982, pulp mills purchased about 930,000 tons of lime, about 6% of total consumption, which plunged to about 15 million tons (down 24% from 1981). In 1983, mill usage and total demand are both expected to increase 5% to 6%. The depressed steel industry's share dropped to 33% of the total in 1982. Other applications include sewage treatment, chemicals, and sugar refining.

Sources: The major manufacturers of merchant lime, produced mainly from calcite ($CaCO_3$) or dolomite ($CaMg[CO_3]_2$) are Genstar, Kerr-McGee, Marblehead Lime, Martin Marietta Chemicals, Mississippi Lime, Pfizer, Steetley Industries, and U.S. Gypsum. (Steetley purchased Domtar's Tacoma, Wash., plant in early 1981, while Domtar completed its withdrawal from U.S. production by closing its Bellefonte, Pa., facility in mid-1982.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, tight in eastern U.S.; market in West; 1978, market to tight.

Pricing: Quicklime: 1982, $57.80/ton; 1981, $51.63/ton; 1980, $46.10/ton; 1979, $41.16/ton; 1978, $36.75/ton.

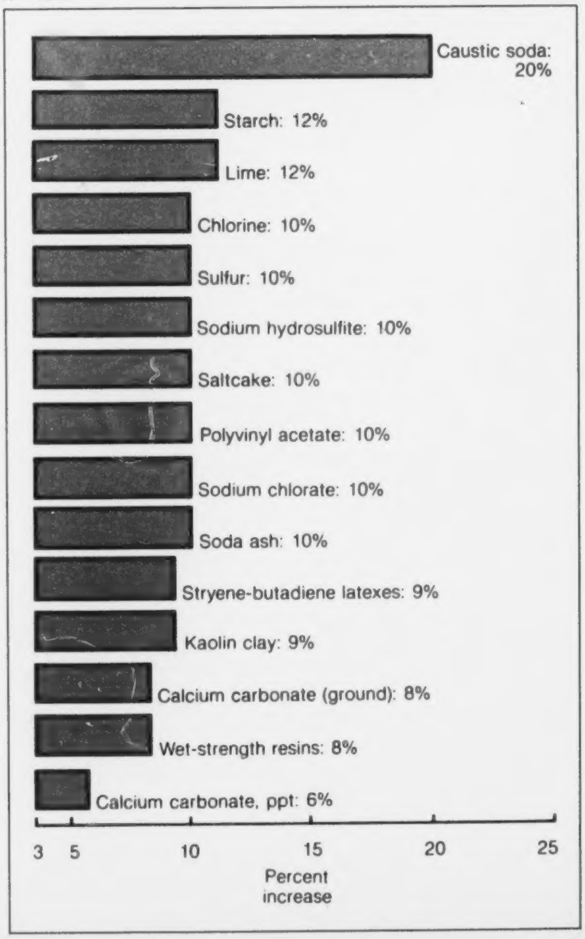
Forecast: Demand by some of the smaller end-use areas for lime should rise at least 10% this year and in 1984. However, the slow recovery by the steel industry will restrict growth in demand by that sector between 5% and 10% in 1983 and 1984, keeping overall demand growth down.

Polyvinyl alcohol

Uses: Polyvinyl alcohol (PVA) is employed by the paper industry mainly as a surface size for printing and writing papers and paperboard, and as a coating binder.

Demand: In 1982, paper industry usage of PVA was between 9

FIGURE 2: **Projected U.S. price increases for major chemicals in 1984.**



and 10 million lb, about 8% of the estimated total merchant demand of 122 million lb. In 1983, demand by paper and board mills should return to the 1981 level of almost 11 million lb, while total consumption should reach the 135-million-lb level. Imports were down to 21 million lb in 1982 (from 24 million) but at the end of July 1983 were at an annual rate of almost 35 million lb. PVA's largest end-use is for textiles (50%), followed by adhesives (25%, emulsifiers (12%), and other applications (5%).

Sources: U.S. producers of PVA, derived from the hydrolysis of polyvinyl acetate, are (in descending order of capacity): E.I. DuPont, Air Products & Chemicals, and Monsanto. Air Products & Chemicals and DuPont both make fully hydrolized (FH) PVA, while Monsanto produces only partially hydrolized (PH) material. Air Products & Chemicals also makes the PH grade and is expanding its Calvert, Ky., facility in two phases which are due onstream in early 1984 and in late 1985, respectively. DuPont's LaPorte, Texas, expansion—which will allow it to make PH product as well—has been delayed until early 1985.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1983, $1.05/lb, delivered; 1982, $1.05/lb; 1981, $1.00-$1.05/lb; 1980, 86.5¢-91.5¢/lb; 1979, 77.5¢/lb; 1978, 69.5¢/lb.

Forecast: Although paper industry usage should increase about 10% in 1983, following last year's 9% drop, annual growth over the next three or four years should average 3% to 4%. By the end of 1985, industry capacity is expected to be close to 300 million lb.

Saltcake

Uses: Saltcake (sodium sulfate) is the main source of makeup sodium and sulfur values in kraft pulp mills.

Demand: In 1982, kraft pulp mills consumed an estimated 594,000 tons of saltcake, about 48% of the total consumption of 1.24 million tons. Mill usage in 1983 is expected to increase slightly (between 2% and 3%) to approximately 608,000 tons. Other major end-uses include: detergents (39%) and glass manufacture (13%).

Sources: Sodium sulfate is produced from both natural deposits or as a byproduct in the manufacture of rayon, sodium bichromate, and hydrochloric acid. Since 1980, the share of natural sulfate has dropped to 44% from 52%. By year-end 1983, it could go down another percentage point as one of the synthetic producers brings onstream a new HCl facility in Utah. Major producers of natural saltcake include: Great Salt Lake, Kerr-McGee, and Ozark-Mahoning. (Great Salt Lake had closed its plant in April 1981 and reopened it again in 1983). Major synthetic producers are: Allied Chemical, Akzona, Avtex, Climax Chemical, Diamond Shamrock, Koppers, and Morton.

Availability: 1983, market; 1982, market; 1981, market; 1980, tight to market; 1979, market to tight; 1978, market.

Pricing: 1983, $91/ton, f.o.b. producing plant; 1982, $79-$86/ton; 1981, $68-$79/ton; 1980, $60-¢68/ton; 1979, $47-$52/ton; 1978, $35-$45/ton.

Forecast: Total sodium sulfate production is not expected to increase more than about 2%, although byproduct sulfate output should rise between 12% and 13%, as natural production drops about 10%. The long-term prospects for pulp mill saltcake consumption depends on the extent of chlorine dioxide substitution in the first bleaching stage. The effluent from ClO_2 generators contains sodium and sulfur values that can be used in place of purchased saltcake. As the economy continues to improve, mill demand in 1984 could rise another 5,000 tons or so. Imports from Canada, which reached a record level in 1982 (almost 406,000 tons) are expected to decrease this year to about 365,000 tons. However, total U.S. imports are slated to rise this year to about 435,000 tons, 11% ahead of 1982.

Sodium chlorate

Uses: The major use of sodium chlorate is for onsite generation of chlorine dioxide (ClO_2).

Demand: In 1982, pulp mills used an estimated 279,000 tons of Na_2ClO_3, 82% of total apparent consumption of about 341,000 tons. Mill demand should increase in 1983 to about 290,000 tons. Other uses are chlorates (7%), uranium processing (5%), agriculture (4%), and miscellaneous applications (2%).

Sources: The major producers of sodium chlorate—derived from electrolysis of an acidified sodium chloride solution—include Erco Industries, Georgia-Pacific, Kerr-McGee, Occidental Chemicals, Olin, and Pennwalt. Smaller facilities are operated by Brunswick Chemical, Huron Chemicals, and Pacific Engineering. Canadian imports in 1982 accounted for about 25% of total chlorate demand.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, tight.

Pricing: 1983, $420/ton, f.o.b. works, freight equalized; 1982, $420/ton; 1981, $375/ton; 1980, $345-$375/ton; 1979, $335-$345/ton.

Forecast: By next year a new producer will have come on the scene as Kema Nord Bleaching Chemicals (a division of Swedish-based Kema Nobel) acquires the Columbus, Miss., plant of Occidental Chemicals. Imports from Canada in 1983 are predicted to reach almost 95,000 tons, compared with 86,000 tons last year.

Sodium hydrosulfite

Uses: Sodium hydrosulfite is used as a bleaching agent for mechanical and deinked pulp.

Demand: In 1982, the paper industry used an estimated 16,700 tons (excluding hydrosulfite produced *in situ* from Borol). Apparent consumption is about 44,000 tons. The textile industry is the largest consumer of sodium hydrosulfite (used in vat dyeing) and accounts for about 40% of total demand. Other end-uses include clay bleaching (20%), miscellaneous (2%).

Sources: There are still only two sodium hydrosulfite producers in the U.S.: Olin and Virginia Chemicals (a Celanese subsidiary). Virginia Chemicals acquired Royce Chemical in late 1981, but subsequently closed the plant in New Jersey. Borol solution is produced solely by Morton-Thiokol's Ventron Div.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1983, 60¢-63¢/lb (proprietary blends), f.o.b. producing point; 1982, 60¢/lb; 1981, 55¢-60¢/lb; 1980, 43.5¢-55¢/lb; 1979, 41.5¢-43.5¢/lb; 1978, 39.5¢-41.5¢/lb.

Forecast: Merchant sodium hydrosulfite consumption in 1983 may reach 18,000 tons, while apparent consumption increases to about 50,000 tons. Hydrosulfite produced via Borol should also be ahead of the estimated 8,700 tons (100% basis) used by mills in 1982.

Starch

Uses: Starches are the workhorse binders for coating mills and are also used as surface sizes, internal additives, and as an adhesive for corrugated containers.

Demand: In 1982, the paper industry used an estimated 2.8 billion lb, down from the 3 billion required in the previous year, out of a total consumption of 4.3 billion lb. (In 1981, total demand was 4.4 billion lb.) In 1983, mill usage will return to the 1981 level, while total demand should rise to between 4.5 and 4.6 billion lb. Food, brewing, and textiles are other major end-uses for starch.

Sources: Producers are listed in the *P&P Buyers Guide 1981* (p. 32). About 90% of the starch used in the paper industry is cornstarch.

Availability: Unmodified: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market. Modified: 1983, market; 1982, market; 1981, tight to market; 1980, tight; 1979, tight to market.

Pricing: Unmodified: 1983, \$11.50-\$15.88/100 lb, bags, truckloads, f.o.b. plant; 1982, \$11.50-\$12.25/100 lb; 1981, \$11.25-\$14/100 lb; 1980, \$9.50-\$10.50/100 lb; 1979, \$9-\$10/100 lb; 1978, \$8/100 lb. (For bulk prices, deduct \$1.25/100 lb.) Modified starch prices vary for each grade, but generally follow price trends of unmodified starch.

Forecast: The reduced acreage, combined with adverse weather conditions this year, resulted in an almost 50% drop in the 1983 corn crop, and led to list-price hikes of about 40% by the end of the third quarter. (At the end of 1982, the list was \$11.50/100 lb.) An additional 50¢/100-lb price hike is expected by year-end, with a similar boost targeted for mid-1984. Starch demand by the mills should increase between 8% to 9% in 1984, to a predicted 3.25 billion lb, while total starch consumption ranges between 4.7 and 4.8 billion lb.

Styrene-butadiene latex

Uses: The bulk (about 90%) of the styrene-butadiene latex (SBL) employed by the paper industry is used as a coating binder, the remaining 10% accounted for by paper saturation (masking tape and wallpaper).

Demand: In 1982, an estimated 220 million lb of SBL were used by the paper industry, relatively unchanged from the previous year. On the other hand, total latex consumption fell about 3.5% to between 625 and 630 million lb, resulting in a slight increase in the industry's share of the total to 35%. In 1983, paper and board usage is expected to rise to 235 million lb, while total demand increases to 675 million lb (4% above the 1981 level). The major end-use (50%) is in carpetbacking and integral foam, followed by other textile applications and adhesives.

Sources: About 85% of the estimated 915 million lb of annual capacity in the U.S. is shared by four major suppliers (in descending order of capacity): Dow Chemical, Polysar, Reichhold Chemicals, and General Tire. Polysar achieved the second spot by its acquisition of the latex plants of Arco Chemical and GAF.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1983, 71¢-75¢/lb; 1982, 75¢/lb; 1981, 65¢-71¢/lb; 1980, 59¢/lb; 1979, 53¢/lb; 1978, 40¢-43¢/lb. (Effective May 2, 1983.)

Forecast: Feedstock costs are up in 1983, with styrene recording the largest increase, since last year it had been discounted the most. By the end of next year's first quarter, both styrene and butadiene selling prices should return to list levels. SBL prices are expected to rise another 5% to 6% next year.

Sulfur

Uses: Sulfite pulp mills consume the bulk of the sulfur used by the pulp and paper industry. Some is also used directly in kraft pulp mills.

Demand: Pulp mills used less than 1% of the total sulfur consumed in 1982, requiring about 88,000 metric tons. (Total consumption of Frasch and recovered sulfur was about 8.8 million tons.) The bulk of the sulfur purchased is for agchems, petroleum refining, rubber, plastics, inorganic chemicals, and other miscellaneous applications.

Sources: The share of elemental sulfur produced via the Frasch route dropped in 1982 to 43% (52% in 1981), while sulfur from refineries and sour natural gas production accounted for 45% of total sulfur production. Major Frasch producers include Duval, Freeport Sulphur, and Texasgulf. Major suppliers among the more than 60 firms recovering sulfur include Amoco, Atlantic Richfield, Chevron Chemical, Exxon Chemical Americas, Getty, Mobil Chemical, Pursue Gas, Standard (California and Indiana), Texaco Chemical, and Union Oil.

Availability: 1983, market; 1982, market; 1981, tight to market; 1980, tight; 1979, very tight; 1978, market to tight.

Pricing: 1983, \$131-\$124/metric ton, crude, bright, f.o.b. Gulf Coast ports; 1982, \$138.75-\$132.50/metric ton; 1981, \$131.35-\$138.75/metric ton; 1980, \$103.31-\$109/metric ton; 1979, \$70.60/metric ton; 1978, \$61.50/metric ton. Prices of both Frasch and recovered sulfur have dropped in the past year or so. In the third quarter, the f.o.b. Tampa, Fla., price for Frasch had gone down to \$130.30/metric ton, with an additional \$9.84/metric-ton discount available for large-volume customers. The heavy discounting has narrowed the Frasch/recovered differential to about 7%/metric ton from the traditional \$20/metric ton prevailing a couple of years ago.

Forecast: The economic turnaround in 1983 should result in a modest increase (between 5% and 6%) in total sulfur consumption, but selling prices will remain depressed until fertilizer markets return to normal. Usage by the pulp and paper industry is also expected to rise in 1983 to about 95,000 metric tons.

Titanium dioxide

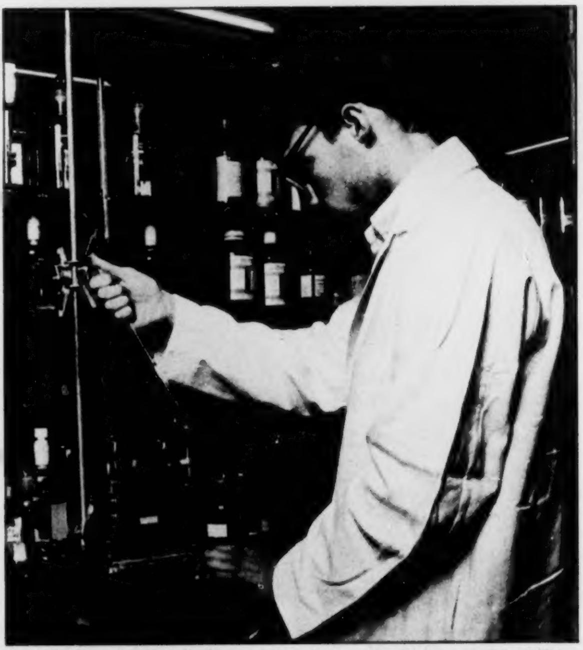
Uses: Both rutile and anatase grades of titanium dioxide (TiO_2) are used by fine paper and board mills as filler and in coating.

Demand: In 1982, mill demand for TiO_2 was down to an estimated 172,000 tons, out of a total apparent consumption of about 720,000 tons. In 1983, mill usage should exceed the 190,000-ton level as total demand also recovers. The largest end-use is by the paint industry (50%), followed by plastics (12%), rubber, and ceramics.

Sources: There are now five TiO_2 producers in the U.S. (in descending order of capacity): E.I. DuPont, SCM, American Cyanamid, Kerr-McGee, and Gulf + Western. SCM acquired G + W's Ashtabula, Ohio, plant earlier this year and plans to expand it by about 22%. Kerr-McGee's smaller expansion is due onstream in the third quarter of 1984.

Availability: Anatase: 1983, market; 1982, market; 1981, market; 1980, market; 1979, tight. Rutile: 1983, market; 1982, market; 1981, market; 1980, market; 1979, tight.

Pricing: Anatase: 1983, 70¢/lb, delivered; 1982, 70¢/lb; 1981, 58¢-70¢/lb; 1980, 57¢/lb; 1979, 53¢/lb; 1978, 46¢/lb. Rutile: 1983, 75¢/lb, delivered; 1982, 75¢/lb; 1981, 63¢-75¢/lb; 1980, 57¢/lb; 1979, 59¢/lb; 1978, 52¢/lb.



Availability of paper industry chemicals should be good in 1984.

Forecast: Selling prices of TiO_2 have finally stabilized, although lists are still being discounted in the range of 6¢ to 7¢/lb. No further temporary valuation allowances (TVAs) are targeted for 1983, but if the economy continues to improve, a 10% hike in the market price could bring it back to the posted level.

Other major chemicals

Alum: Demand for alum remained steady in 1983, as have prices for liquid grade, although there have been reports of dry alum lists being discounted between 17% and 18%. Liquid lists, unchanged for about two years, are still $133/ton in the North, $148.55/ton in the Northeast (New England), and $126/ton in the South. No changes are anticipated in 1983, but a possible 5% boost could occur by mid-1984.

Casein: Throughout 1983, the list price of industrial grade casein has held at the $1.365/lb mark and will probably continue to do so.

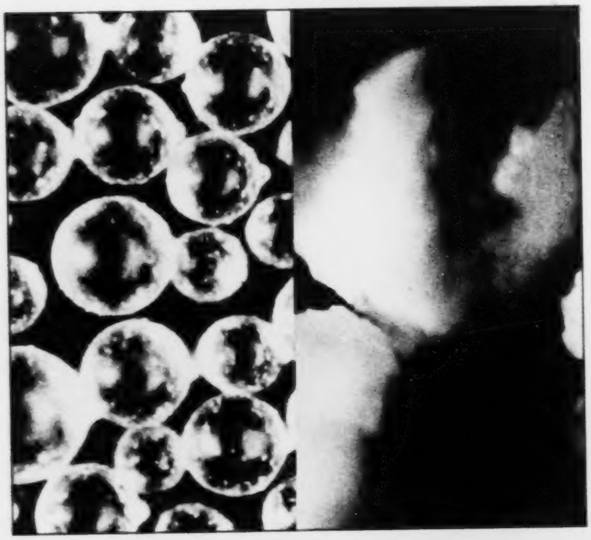
Polyethylene: Low-density, extrusion-coating grade resin had dropped to 37¢/lb at the beginning of 1983, compared with the 45¢/lb list prevailing in January 1982. However, prices have since moved up to the range of 40¢-42¢/lb, and will most likely rise between 5% and 6% in 1984.

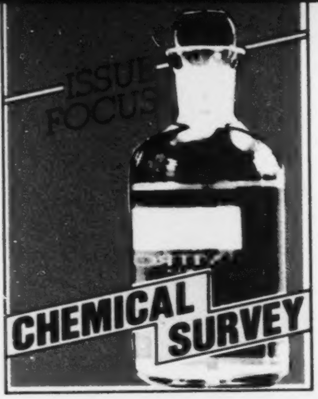
Polyvinyl acetate: List prices for copolymer coating-grade emulsions went up by 2¢/lb in May as monomer (VAM) costs rose, but large-volume buyers are still receiving discounts up to 10% off of the posted 36¢/lb price. Demand this year is up between 12% and 14%, compared with an estimated 15% drop in 1982.

Rosin sizes: A $3.30/100-lb decrease in mid-March this year has brought the price of 70% pale material to $36/100 lb. The new list will probably remain in effect for the balance of 1983 and most of 1984.

Soda ash: List prices of natural trona dropped $8/ton in 1982, the last $2/ton decrease in November 1982 bringing the new list to $84/ton. This price was unchanged during 1983. Although the posted price for synthetic ash (by Allied), f.o.b. Syracuse, N.Y., has remained at the $132/ton level, there are reports of discounting to match the $8/ton decrease for trona.

Wet-strength resins: The posted prices for wet-strength resins have not changed since July 1, 1982, and are expected to hold for the balance of this year. Polyamid-epichlorohydrin (PEC) prices (12.5% solids) are still listed at $23.45/100 lb ($1.88/lb on a dry basis), while urea-formaldehyde (UF) continues to be priced at $20/100 lb and $14.30/100 lb, respectively, for 35% and 25% solids content. (UF dry-weight price is 57¢/lb.) A 6% to 8% hike is expected sometime in 1984.





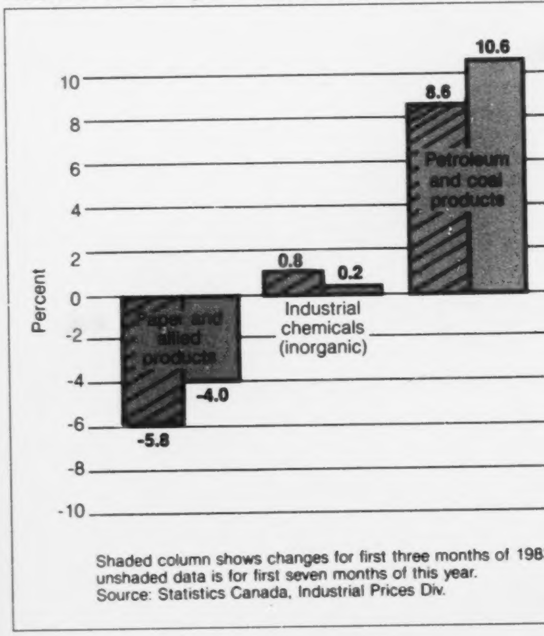
Canadian chemical second half of '83,

■ 1983 began rather inauspiciously as the Canadian pulp and paper industry struggled to climb out of last year's recession—which was reportedly deeper than that experienced in the U.S. However, total chemical demand by mills is expected to be up in 1983, as the second half of the year began to show some signs of significant improvement.

For example, at the half-year mark, production of bleached kraft pulp was down 1% from 1982 levels, but by the end of August production had moved 7% ahead of 1982. In addition, mill inventory for all chemical pulps dropped between 13% and 14% during the eight-month period, reflecting the almost 12% increase in shipments.

A similar improvement was realized by the newsprint sector, although the increase was less dramatic. By the end of August, newsprint production was still down marginally (off 0.3%), compared with the year-ago period, but it was a significant turnaround from mid-year

FIGURE 3: **Canadian price index changes for 1983.**



Shaded column shows changes for first three months of 1983; unshaded data is for first seven months of this year.
Source: Statistics Canada, Industrial Prices Div.

use to pick up in easing discounting

when output was off 4%. Newsprint shipments, on the other hand, were up almost 16.5% after eight months, while mill stocks were reduced some 13% below 1982 levels.

Recovery in mill demand should also mitigate the discounting for pulp and paper chemicals which continued into 1983. The increase in the inorganic chemicals index in July 1983 (see Figure 3) was sharply below the annual hike recorded in the year-ago month (see *P&P*, November 1982, p. 59).

Although there have been some list-price boosts in 1983, with the exception of chlorine, increases have been relatively low. Chlorine prices were boosted to balance the ECU rate and rose 9.7% at the beginning of 1983 and almost 12% on July 1.

Sodium chlorate lists were raised 6% on Jan. 1, while saltcake went up on Apr. 1. There were no price boosts for caustic, soda ash or sulfuric acid. Chlorate and caustic producers indicated earlier this year that they would dispense with discounts once the pulp and paper industry returned to profitability.

As was also the case in the U.S., total Canadian demand for chlorine in 1983 surpassed demand for its coproduct because of the recovery in polyvinyl chloride (PVC) markets both worldwide and domestically. It is expected that the production of ethylene dichloride (EDC) will require upward of 590,000 tons of chlorine this year, compared with the approximately 485,000 tons required in 1982.

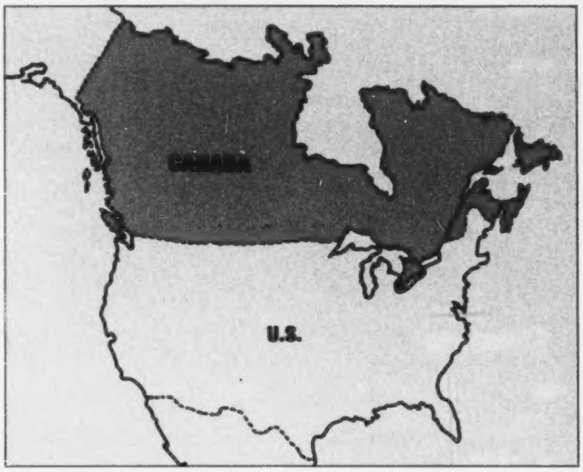
Hydrogen peroxide demand did not reach the level predicted for 1982 (in fact, it only increased about 200 tons), primarily because a couple of mills postponed their expansion plans until 1983. However, the increase in mill usage this year will more than make up for the flat year in 1982. Interox America became the third $H_2O_2$2 supplier to operate from a Canadian base when it completed its proposed storage and distribution terminal in Toronto in mid-1983. Interox had originally intended to build the terminal in Milton, Ont. ■

DEFINITIONS OF SURVEY AVAILABILITY TERMS:

Very tight—On allocation or demand significantly greater than supply.

Tight—Demand slightly greater than supply.

Market—Supply/demand in balance, or excess capacity available.



CHEMICALS: CANADA

Aluminum sulfate

Uses: Alum usage is split about 50:50 between the precipitation of rosin size and pitch control/water treatment applications.

Demand: In 1982, paper mills consumed 98,000 tons, or 57% of total alum consumption. In 1983, total mill usage is expected to increase to 104,000 tons (56% of total demand), of which about 52,000 will be used for sizing. Total alum consumption in 1982 was 171,000 tons (off 4% from the previous year) and in 1983 should reach 185,000 tons. Municipal waste and sewage treatment applications now account for about 35% of total demand, with the balance going into pigments, cellulose insulation, and other miscellaneous end-uses.

Sources: There are two major Canadian alum producers—Alcan Smelters & Chemicals and Allied Chemicals Canada—and three smaller firms in western Canada, the largest (with two plants) being Inland Chemicals (a C-I-L subsidiary). United Chemicals, the smallest of the three, built a second plant in Calgary, Alta., last year to supply the city's sewage treatment facility.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market to tight.

Pricing: 1983, $131.54-$139.70/ton, liquid (17% Al_2O_3), bulk, f.o.b. Valleyfield, Que.; 1982, $131.54/ton; 1981, $100.70-$119.75/ton; 1980, $86-$100.70/ton; 1979, $79-$86/ton.

Forecast: The $8/ton boost in alum prices was slated for Jan. 1, 1983, but did not go into effect until the beginning of the second quarter. No further hike is expected in 1983. Mill usage should grow between 4% and 5%/year through 1987, while total demand should increase at the same rate, primarily due to the expected 9% to 10% growth in sewage treatment uses.

Caustic soda

Uses: Caustic soda (NaOH) is used in the extraction stages of kraft or sulfite bleach plants, for hypochlorite makeup and in sulfite pulping.

Demand: In 1982, pulp mills consumed about 893,000 tons of caustic (63% of total domestic demand), with 661,000 tons used in the bleach plant. An additional 282,000 tons were employed for pulping applications. In 1983, demand should rise between 5% and 6% to 943,000 tons (707,000 tons for bleaching end-uses). The next largest end-uses are in the production of propylene oxide and alumina, which last year accounted for 7% and 5.5%, respectively, of total demand.

Sources: Caustic is a coproduct of chlorine production. See the chlorine profile for major producers.

Availability: 1983, market; 1982, tight to market; 1981, very tight to market; 1980, very tight; 1979, tight; 1978, tight.

Pricing: 1983, $417/ton, 50% solution, bulk, f.o.b. works, freight equalized; 1982, $381-$417/ton; 1981, $293-$381/ton; 1980, $195-$293/ton; 1979, $183-$195/ton; 1978, $175-$183/ton.

Forecast: Unlike chlorine, caustic prices have remained steady since April 1982 and are not likely to increase before early next year. Pulp production is beginning to show signs of recovering from the 1982 recession, with industry output up almost 12% in June. If this pace is maintained, caustic demand should grow at least another 6% in 1984.

Chlorine

Uses: Chlorine's major use by the pulp and paper industry is as a bleaching agent in kraft and sulfite pulp mills. A smaller use is for onsite hypochlorite makeup.

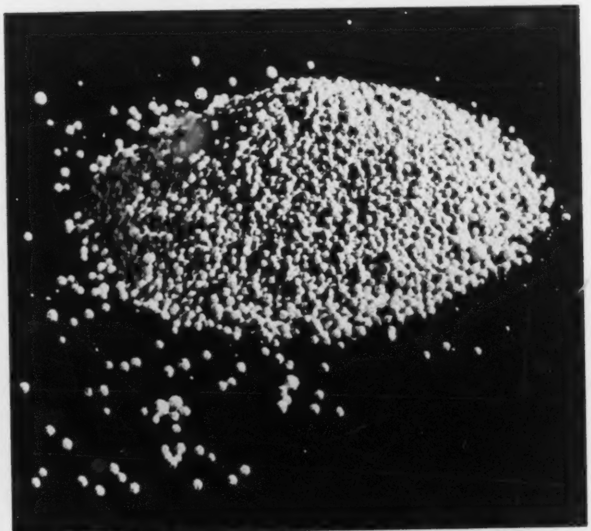
Demand: In 1982, the pulp and paper industry used about 507,000 tons of chlorine, down about 10% from the 562,000 tons consumed in 1981. In 1983, demand by mills is expected to increase between 4% and 5%—to 529,000 tons—although the industry share of total demand will drop to 37.5%. The major end-use for chlorine, ethylene dichloride (EDC) production, should account for 42% of the total in 1983.

Sources: Chlorine is produced along with caustic by the electrolytic reduction of brine. Major chloralkali producers include C-I-L, Canadian Occidental Petroleum, Dow Chemical Canada, FMC Chemicals, and PPG Industries' Stanchem Div.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, tight; 1978, tight.

Pricing: 1983, $308.45[1]-$344.75[2]/ton, bulk, f.o.b. works; 1982, $254-$281.25/ton; 1981, $225-$254/ton; 1980, $195-$225/ton; 1979, $163-$195/ton; 1978, $145-$163/ton. (1. Effective Jan. 1, 1983. 2. Effective July 1, 1983.)

Forecast: Although chlorine prices normally are raised once a year, the second price boost in 1983 was not unexpected, in view of the need by the chloralkali producers to restore their ECU value. A third increase could occur before year-end. Chlorine usage by the mills will decrease over the longer term as ClO_2 use grows, but not as quickly as originally projected. Only one mill has replaced the theoretical maximum of its first-stage chlorine requirements, while most mills operate in the 6% to 8% range. Four mills are replacing between 25% and 30% of their chlorine needs. In the immediate future, chlorine demand by the mills should grow about 2%/year to 1987.



Demand growth for lime should taper off in the long term.

Hydrogen peroxide

Uses: The pulp and paper industry employs hydrogen peroxide (H_2O_2) as a bleaching agent for mechanical and chemical pulps. It is also used in the bleach plant as a partial replacement for ClO_2.

Demand: In 1982, Canadian mills used an estimated 5,100 tons of H_2O_2, about 68% of total peroxide consumption. In 1983, mill usage is predicted to reach 6,800 tons, 72.5% of total demand. Other end-uses include textiles (8%), water treatment (5%), and miscellaneous applications (14%).

Sources: All of the peroxide consumed in Canada is imported. The major importers are C-I-L and DuPont Canada, which bring in H_2O_2 from FMC and E.I. DuPont, respectively. FMC and Interox America ship in some on a direct basis, while several distributors handle European H_2O_2.

Availability: 1983, market; 1982, market; 1981, market; 1980, market to tight; 1979, market; 1978, market.

Pricing: 1983, 58.7¢/lb[1], bulk, 70% solution, f.o.b. Toronto, Ont./Montreal, Que.; 1982, 52.5¢/lb; 1981, 52.5¢/lb; 1980, 44¢-47.5¢/lb; 1979, 41¢-44¢/lb; 1978, 36¢-41¢/lb. (1. Effective Jan. 1, 1983.)

Forecast: As expected, hydrogen peroxide prices rose at the beginning of 1983 but are not slated to change much before the second quarter of 1984. Consumption of H_2O_2 by mills could reach the 15,000-ton level by 1987.

Hydrosulfites, borohydride solution

Uses: Almost all newsprint mills bleach groundwood with hydrosulfite, purchased or generatedonsite via the Borol process.

Demand: In 1982, the pulp and paper industry used an estimated 9,700 tons of merchant sodium hydrosulfite and an additional 8,400 tons of Borol (12% active borohydride basis). Vat drying of cotton accounted for about 12%.

Sources: No hydrosulfite is produced in Canada. VirChem Canada imports blended hydrosulfites from its U.S. parent, Virginia Chemicals (a subsidiary of Celanese), while various distributors import product from Europe. Morton-Thiokol's Ventron Div. supplies Borol.

Availability: Hydrosulfite blends: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: Blended: 1983, 71¢/lb, delivered, eastern Canada; 1982, 69.4¢-71¢/lb; 1981, 59¢-69¢/lb; 1980, 51.4¢/lb. Nonblended: 1983, 61¢-68¢/lb; 1982, 61¢-71.5¢/lb; 1981, 66.4¢-71.5¢/lb; 1980, 56¢-71.5¢/lb; 1979, 47.5¢-56¢/lb.

Forecast: Mill usage should rise to 9,000 tons in 1982. Last year, mill downtime reduced consumption by about 500 tons. Annual demand growth for the next three to four years should average about 8%. Borol usage increased in 1982 about 9% and should grow an additional 5% in 1983 (to 8,800 tons), while the average annual increase to 1987 will be about 7%.

Kaolin

Uses: Kaolin is used by paper and paperboard mills as a coating pigment (57%) and as a filler (43%).

Demand: In 1982, coating applications consumed an estimated 115,000 tons of kaolin clay, while an additional 90,000 tons were used as a filler, representing about 87% of total kaolin demand. In 1983, usage should increase to 129,500 tons and 90,000 tons, respectively. Until this year, imports had decreased annually since 1980, however, at the half-way mark in 1983, imports from the U.S. were running at an annualized rate of about 267,000 tons, compared with the 227,000 tons imported last year.

Sources: U.S. suppliers are listed in *P&P Buyers Guide 1982* (p. 32). **Imports primarily from the U.K. have fallen off sharply, dropping to 780 tons in 1982 from 21,500 tons in 1981.**

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market to tight.

Pricing: Water-washed No. 1 coating grade: 1983, $218-$255/ton, f.o.b. Georgia; 1982, $218/ton; 1981, $215-$218/ton; 1980, $208-$218/ton; 1979, $194-$208/ton. Dry-ground, air-floated filler grade: 1983, $60/ton (same basis); 1982, $60/ton; 1981, $47-$60/ton; 1980, $43-$47/ton; 1979, $35-$43/ton.

Forecast: Mill demand should rise 5% and 7% for coating and filler pigments, respectively, on the average over the next four years. Consumption by 1987 should be 155,000 and 117,000 tons, respectively.

Lime

Uses: Kraft mills purchase lime to supplement their calcium requirements in the recovery cycle.

Demand: In 1982, pulp mills purchased an estimated 238,500 tons of lime (12.5%) out of a total consumption of slightly less than 2 million tons. In 1983, mill lime usage should increase by about 7,500 tons. The largest lime consumers are iron and steel mills, which consumed 570,000 tons in 1982, down sharply from the 711,000 tons used in 1981. Other lime end-uses, in descending order of volume, include chemicals, uranium recovery, nonferrous smelters, water and sewage treatment, and sugar refining.

Sources: There are about nine merchant lime producers in Canada. The three major firms (based on nameplate capacity) are Domtar, Steel Bros. of Canada, and BeachviLime, which has a captive steel company customer as well (Dofasco). Algoma Steel and Steel Co. of Canada also have large captive operations. Most lime plants are located within reasonable shipping distance of their customers because of high transportation costs, which continue to escalate.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, tight to market; 1978, market.

Pricing: Quicklime: 1983, $60/ton, bulk, f.o.b. Ont. producing plant; 1982, $55-$59/ton; 1981, $46-$55/ton; 1980, $40.98-$46/ton; 1979, $34.98/ton; 1978, $32.48-$34.98/ton.

Forecast: The percentage of total lime consumption accounted for by mill purchases will decline over the long term, particularly as more mills opt for oxygen enrichment in the lime kiln. However, over the next four years, merchant lime usage should increase between 3% and 4%/year. Last year's 20% drop in steel output resulted in total lime demand decreasing by 8.5%. Demand growth had already begun to slip in 1981 (up 1.7%), after rising an average of 5.5%/year from 1971-79. Exports were down last year as well (over 35%) since the bulk of shipments to the U.S. are to the steel industry.

Saltcake

Uses: Saltcake is used by kraft pulp mills for sodium and sulfur makeup.

Demand: In 1982, pulp mills used 237,000 tons, about 75% of total sulfate demand (318,000 tons). The slump in the market pulp area resulted in an almost 25% drop from 1981. Mill consumption should decrease about 2.5% in 1983.

Sources: Most sodium sulfate comes from the Glauber's salt deposits in Alberta and Saskatchewan. Byproduct sulfate capacity is only 11% of total. Major producers include Alberta Sulphate, Hudson's Bay Mining & Smelting's Francana Minerals Div., Midwest Chemicals, Ormiston Mining & Smelting, and Saskatchewan Minerals. The latter firm acquired the closed facility of Sybouts Sodium Sulphate in late 1981 and reopened it last May. Saskatchewan Minerals also placed its small (40,000-tpy) Bishopric unit on indefinite standby at the beginning of 1983. The two byproduct sulfate producers are Courtaulds and Ontario Paper, both in eastern Canada.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1983, $75-$81[1]/ton, bulk, saltcake, f.o.b. producing point; 1982, $70-$75/ton; 1981, $55-$70/ton; 1980, $50-$55/ton; 1979, $50/ton; 1978, $45-$50/ton. (1. Effective Apr. 1, 1983.)

Forecast: There has been no change in the price of saltcake since spring and none is expected this year. If pulp markets continue to improve, an 8% to 10% boost could occur by the second or third quarter in 1984. Over the long term, more effluent recycling from ClO_2 generators will reduce the amount of saltcake mills purchase.

Sodium chlorate

Uses: Sodium chlorate is used in chlorine dioxide generators.

Demand: In 1982, pulp mills used an estimated 183,000 tons of sodium chlorate, about 95% of total chlorate consumption (194,000 tons). The slowdown in pulp markets reduced mill demand last year by about 7%. Uranium leaching, the only other significant end-use for chlorate, required about 10,500 tons in 1982.

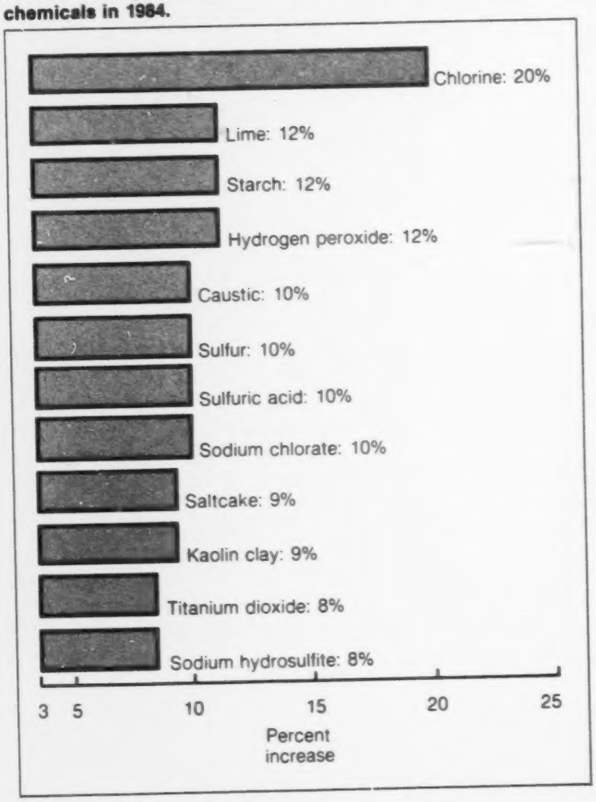
Sources: Canadian merchant producers of sodium chlorate are BCM Technologies, Canadian Occidental, Erco Industries, QueNord, and PPG Industries' Stanchem Div. BCM's new plant near Windsor, Que., went onstream in the third quarter. QueNord has undergone two name changes since 1979 when it began operations as QueNord Chemicals. In 1982, it took the name of its Swedish parent KemaNobel and early this year reverted to QueNord. The three remaining captive producers are B.C. Chemicals, St. Anne Chemical, and Saskatoon Chemicals.

Availability: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, tight.

Pricing: 1983, $435/ton, bulk, f.o.b. works, freight equalized; 1982, $410/ton; 1981, $365/ton; 1980, $310-$330/ton; 1979, $310-$330/ton; 1978, $250-$281/ton.

(Continued on next page)

FIGURE 4: **Projected Canadian price increases for major chemicals in 1984.**



Forecast: Pulp mill demand for sodium chlorate is expected to increase by approximately 12% to 205,000 tons in 1983, and then continue to grow about 8%/year to mid-decade. No boost in the list price, effective Jan. 1, 1983, is expected before next year.

Starch

Uses: The paper industry's major use of starch (about 80%) is at the size press, with some employed in coating. Wet end applications account for a small quantity.

Demand: In 1982, the paper industry used an estimated 70,000 tons of starch, about 16% of total consumption; this should increase about 4,400 tons in 1983. The production of corn sweeteners accounted for about 64% of total demand in 1982. Other end-uses include food starches, corrugated and other adhesives, ore flotation, and other applications.

Sources: The bulk of the starch used by the paper industry is derived from corn. Major cornstarch producers include Canada Starch, Nacan Products, St. Lawrence Starch, and Zymaize. International Grain Products is a smaller producer of cornstarch and also supplies wheat starch.

Availability: Unmodified: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market. Modified: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: 1983, native pearl (unmodified), $19.79-$21.77/100 lb, truckload, bags, f.o.b. Toronto, Ont./Montreal, Que.; 1982, $19.25-$20.70/100 lb; 1981, $19.25/100 lb; 1980, $14.59-$19.25/100 lb; 1979, $14.59/100 lb; 1978, $12.60-$14.59/100 lb. Modified starch prices vary according to grade and generally follow the price trend for unmodified starches.

Forecast: Reduced U.S. crop forecasts for 1983 of almost 50% from last year's record crop has firmed prices. Unmodified pearl starch prices rose to $21.77/100 lb on Aug. 8, 1983. A 10% boost is expected by year-end or early in 1984, with an additional 10% increase expected later next year. Over the longer term, annual growth in mill demand should average between 2% and 3% to 1987.

Sulfur

Uses: Sulfite pulp mills that do not purchase liquid sulfur dioxide burn sulfur to produce gaseous SO_2 for sulfite and bisulfite cooking liquor makeup. ClO_2 generation and other uses in the bleach plant consume small amounts.

Demand: In 1982, an estimated 220,000 metric tons of sulfur were purchased by the Canadian pulp and paper industry, accounting for about 32.5% of total consumption (about 680,000 metric tons). In 1983, the industry's usage is expected to increase about 8% to 238,000 tons, 31% of total demand. The largest end-use for sulfur is sulfuric acid production (60%), followed by carbon disulfide, rubber vulcanization, and other miscellaneous applications.

Sources: All sulfur produced in Canada is recovered, either from sour-gas operations or petroleum refineries. Major producers include Amoco, Canadian Occidental Petroleum, Canterra Energy, Chevron Standard, Dome Petroleum, Petrogas Processing, Shell, and Westcoast Transmission.

Availability: 1983, market; 1982, market; 1981, tight to market; 1980, tight; 1979, tight.

Pricing: 1983, crushed, slate, or molten, $78.72-$83.64/metric ton, f.o.b. producing point; 1982, $73.80-$81.18/ton; 1981, $59.98-$74.48/ton; 1980, $32.76-$59.98/ton; 1979, $24.82-$29.79/ton. (Note: prices in Canadian dollars.)

Forecast: Although sulfur list prices have increased over the past two years, the average selling prices for North American shipments have gone down since the beginning of this year. By May, the average (in Canadian dollars) had dropped to $59.74/metric ton from the $62.27/ton prevailing in January and the $64.36/ton recorded for 1982. Despite an estimated 8% increase in pulp and paper industry consumption this year, mill usage over the longer term will drop, and demand by 1987 will be down to 190,000 metric tons.

Sulfuric acid

Uses: The major use of sulfuric acid (H_2SO_4) is in the kraft pulp mill for chlorine dioxide generation.

Demand: In 1982, 242,500 tons of sulfuric acid were consumed by Canadian pulp mills out of a total of 3 million tons. Pulp mill use in 1983 is expected to increase to 262,500 tons. Phosphoric acid production, the major end-use, accounted for about 52% of the total in 1982, down from 60% in the previous year. Other end-uses include agricultural chemicals, petroleum refining, soaps and detergents, and viscose rayon.

Sources: Major merchant producers include Borden Chemical, Canadian Electrolytic Zinc (Noranda), Cominco, Inco Metals, Inland, Chemicals, and Kidd Creek Mines (formerly Texasgulf Canada). In 1981, Inco acquired C-I-L's Copper Cliff, Ont., plant, its output now marketed by C-I-L. C-I-L also sells Kidd Creek's acid, as well as the acid not required captively by Falconbridge Nickel. Allied Chemical ceased acid production in late 1983. Esso Chemicals Canada and Western Cooperative Fertilizers are the major captive acid producers.

Availability: 1983, market; 1982, market; 1981, tight to market; 1980, market to tight; 1979, tight to market; 1978, very tight.

Pricing: 1983, 66° Baume, $89.63[1]/ton, bulk, f.o.b. producing points, eastern Canada; 1982, $84.55/ton; 1981, $69.31-$84.55/ton; 1980, $60.87-$69.31/ton; 1979, $52.40-$60.87/ton. (1. Effective Jan. 1, 1983.)

Forecast: Pulp mill acid consumption rose 8% in 1983 (compared with a 13% drop last year), but mill demand is not expected to reach the 1981 level until mid-decade. Sulfuric acid list prices have remained steady throughout 1983, but an 8% to 10% boost is predicted for 1984.

Titanium dioxide

Uses: About 90% of the anatase titanium dioxide (TiO_2) used by the paper industry is employed for fine paper applications, with the balance used in paperboard.

Demand: Mill usage in 1982 increased 7% to 7,700 tons, 12% of a total demand of 62,500 tons. In 1983, mill demand should reach 67,250 tons. Last year, total consumption had dropped more than 10% as the major end-use for TiO_2—the paint industry—experienced a downturn of over 15%. Its share went down to 56% of the total (from about 59.5%), while plastics applications account for about 16%.

Sources: There are two domestic producers—NL Chem Canada and Tioxide of Canada—with a combined capacity of almost 83,000 tons.

Availability: Untreated anatase: 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1983, $80/100 lb, untreated anatase, delivered, truckload, bags; 1982, $74.50-$80/100 lb; 1981, $69-$74.50/100 lb; 1980, $59-$69/100 lb; 1979, $48.50-$59/100 lb. (bulk slurry carries a 50¢/100 lb premium.)

Forecast: Although list prices for TiO_2 have not changed since Jan. 18, 1982, a 2¢/lb TVA was applied at the beginning of February, originally slated to remain in effect for three months. However, continuing pressure from low-priced imported product resulted in the TVA remaining in force until late in the third quarter. No increase in the list is anticipated much before early 1984. Mill usage is expected to increase about 8%/year over the next four years, while total demand grows between 7% and 8% during the same time frame.

NOTE

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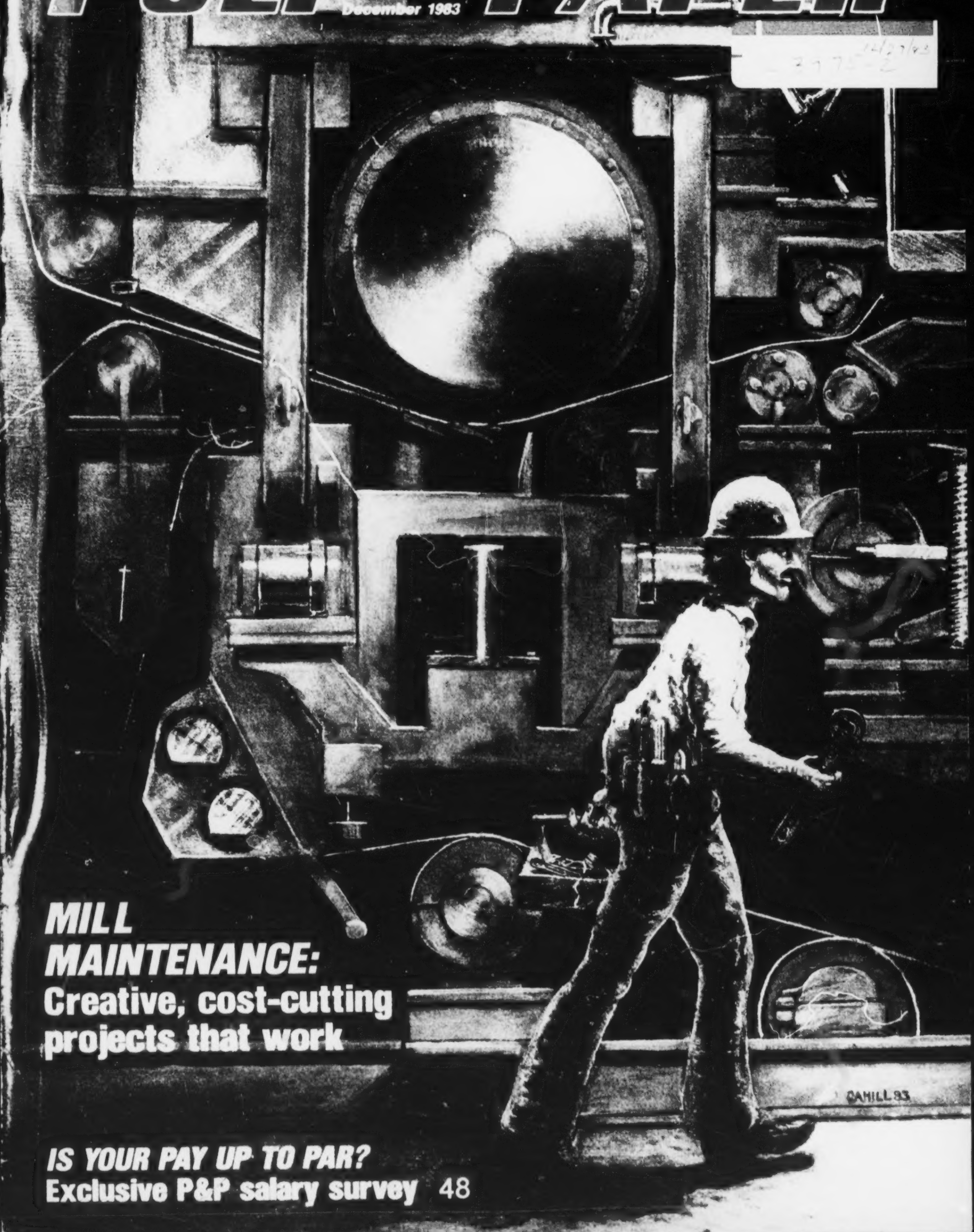


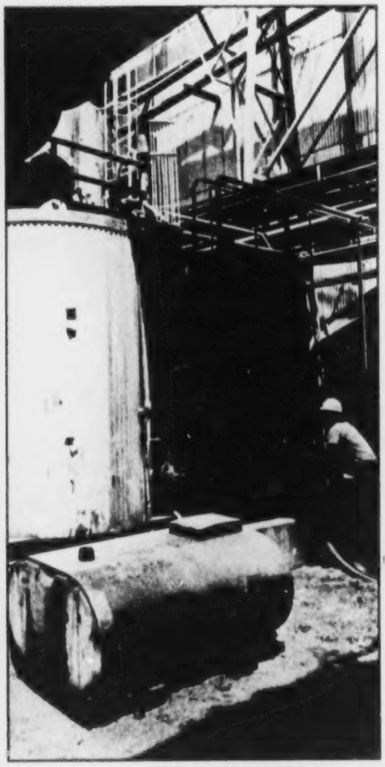
MILL MAINTENANCE:
Creative, cost-cutting projects that work

IS YOUR PAY UP TO PAR?
Exclusive P&P salary survey 48

PULP&PAPER

Volume 57 Number 13 December 1983

SALARY SURVEY **48**



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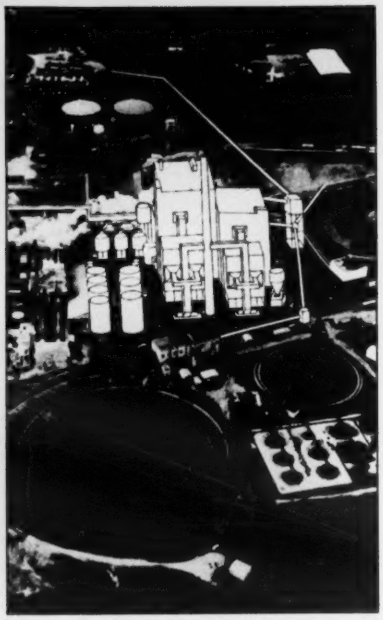

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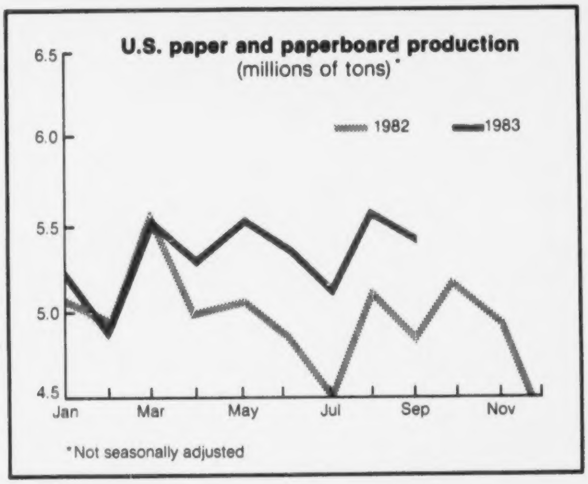
MONTH IN STATISTICS

U.S. paper and paperboard production in September totaled 5.434 million tons, up 12.1% from September 1982, according to the American Paper Institute. The August-September two-month moving average of seasonally adjusted data jumped to a record 66.8 million tpy—and preliminary data for October show production increasing to a rate above 67 million tpy. Total paper and board production for the first nine months averaged 63.8 million tpy, up 7.5% from 1982.

Among major grades, printing/writing papers continued to lead the way, with coated and uncoated free-sheet papers both posting gains above 11% over 1982. Tissue, up 11.6%, and kraft packaging and industrial papers, up 9.1%, also showed strong gains over last year. Paperboard production through September increased 13.5% over a year earlier, with linerboard up a sharp 16.7%. Corrugated box shipments through September rose 8.1% compared to 1982, according to the Fibre Box Assn.

Canadian newsprint shipments totaled 737,000 metric tons in September, up 22.7% from September 1982, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates were 86%, up from 69% last September.



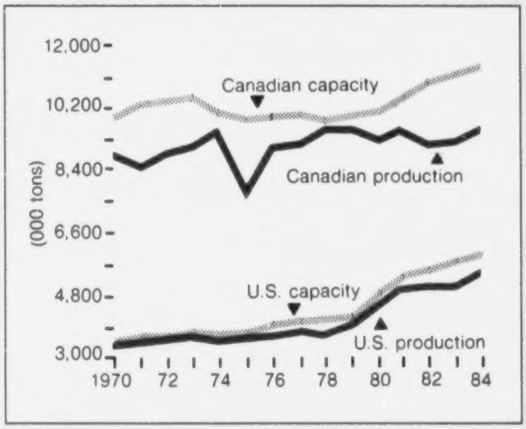
		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	September	415	7.5	5,132	0.8
Uncoated groundwood (s)	September	126	4.1	1,471	2.3
Coated paper (s)	September	469	11.1	5,578	11.4
Uncoated free sheet (s)	September	698	11.3	8,580	9.6
Unbleached kraft packaging and industrial (s)	September	335	9.1	3,775	2.9
Tissue	September	385	11.6	4,735	7.8
Total paper	**September**	**2,708**	**10.8**	**32,468**	**6.9**
Kraft linerboard, unbleached	September	1,320	16.7	14,950	10.1
Semichemical medium	September	395	8.2	4,673	6.0
Bleached paperboard	September	306	7.0	3,869	3.6
Recycled paperboard	September	609	13.4	7,124	8.6
Total paperboard	**September**	**2,726**	**13.5**	**31,712**	**8.0**
Total paper and paperboard*	**September**	**5,434**	**12.1**	**64,180**	**7.4**
PULP, WASTEPAPER & FIBER [2]					
Total woodpulp production	August	4,460	5.5	51,972	3.8
Market pulp production	August	566	7.8	6,418	8.7
Wastepaper consumption at paper/board mills	August	1,205	1.4	14,186	5.2
Pulpwood consumption (cords)	August	7,395	9.4	85,046	7.4
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	September	22.317	8.1	188.421†	6.2
Containerboard inventories at box plants	Sept. 1	2,421	−5.2		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	August	767	15.5	8,670	9.1
Imports of Canadian newsprint	August	578	13.8	6,708†	2.7
U.S. paper exports (including products)	August	380	13.4	4,605	8.0
Exports of unbleached kraft linerboard	September	200	29.9	2,244	13.3
Exports of woodpulp	August	289	3.6	3,548	1.6
CANADIAN STATISTICS [4] (reported in metric tons)					
Total newsprint shipments	September	737	22.7	6,188†	3.9
Operating rates	September	86%	69%	83%	83%
Inventories held by U.S. consumers	Sept. 30	1,303	−9.0		
Woodpulp shipments (export only)	September	594	21.7	4,977†	12.8
Operating rates	September	82%	61%	83%	79%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Newsprint: Economic recovery begins to bolster demand, prices

Statistics:	**1982**	**1983**	**1984e**
United States			
Production, 000 tons	5,041	5,000	5,419
Capacity, 000 tons	5,654	5,752	5,955
Utilization rate, %	89	87	91
Apparent U.S. consumption			
000 tons	11,150	11,300	11,920
lb/capita	95.6	96.4	101.0
000 tons/$billion real GNP	7.51	7.36	7.40
Canada			
Production, 000 tons	8,947	9,240	9,571
Capacity, 000 tons	10,951	11,133	11,260
Utilization rate, %	82	83	85

e=estimate



Estimated annual capacities of top companies are:

	Annual capacity (000 short tons) Canada	U.S.	Total	Capacity share (%)
1. Abitibi-Price	1,904	250	2,154	12.8
2. CIP	1,320	—	1,320	7.8
3. Bowater[1]	350	920	1,270	7.5
4. MacMillan Bloedel	1,163	—	1,163	6.9
5. Consolidated-Bathurst	1,010	—	1,010	6.0
6. St. Regis	—	811	811	4.8
7. Kimberly-Clark[2]	388	421	809	4.8
8. Boise Cascade[3]	249	461	710	4.2
9. Ontario Paper	710	—	710	4.2
10. Publishers Paper	—	585	585	3.5
11. Kruger	517	—	517	3.0
12. B.C. Forest Products	480	—	480	2.8
13. Crown Forest[4]	467	—	467	2.8

1. Includes Catawba Newsprint (51% owned) and Calhoun, Tenn. mill.
2. Includes Spruce Falls Power & Paper (50.5% owned).
3. Includes Boise Southern, DeRidder, La.
4. Former Crown Zellerbach mill, sold to Fletcher Challenge of New Zealand in 1983.

North American capacity (1983): 16.885 million tons
Capacity share of top five companies: 41.0%
Capacity share of top ten companies: 62.4%

GRADE STRUCTURE. The newspaper industry is the primary consumer of newsprint. Considerably less tonnage is directed to other end uses, which include advertising supplements, government publications, comic books, and commercial printing. About one-quarter of all newsprint is used in offset printing, but most is printed on letterpress machines. Although some newsprint with basis weights of 28.5 lb/3,000 ft² and lower is made, the standard remains 30 lb.

PRODUCTION/CAPACITY. Newsprint demand began to improve during the last half of 1983, spurred on by the economic recovery in the U.S. and some signs overseas markets were starting to pick up. The two-year recession brought about some changes in the industry—the shutdown of some inefficient paper machines and conversion of others to groundwood papers resulted in a net loss of 451,000 short tpy in Canada in 1983.

At the same time, capacity in the U.S. and Canada increased. This trend is expected to continue. As U.S. producers expand domestically, Canadian market share will diminish. Canadian newsprint capacity is expected to grow at an average annual rate of 155,000 short tpy during 1983-86, to 11.57 million tons. U.S. capacity will increase to 5.99 million tons by 1985, compared to 5.75 million tons this year.

Publisher inventories were somewhat high at the end of August compared to two years ago, but down from a year earlier. Some attributed high stock levels to the threat of a strike in British Columbia, but others felt the glut would prevent any shortages even if a province-wide work stoppage lasted for a month. Some buyers began stocking up during the latter part of the summer in anticipation of price increases scheduled for July 1, some observers said.

OUTLOOK. Newsprint markets are expected to pick up through 1984 as the economic recovery accelerates. With no new newsprint capacity scheduled to come online for at least two years, operating rates should begin to pick up with supply and demand coming into balance in 1985-86. By 1985 Canadian industry operating rates should surpass 90% and may peak around 91% in 1986, according to one forecast. Prices are expected to stabilize early in 1984 and may rise in the second half of the year as producers try to restore depressed profit margins. Nevertheless, profitability in 1985-86 is not expected to achieve past cyclical peaks.

PRICING. Prices fell $28/short ton to $425 on Nov. 1, 1982, effectively rolling back the mid-1981 price increase. In July 1983, West Coast producers rolled back prices to $404/ton, while eastern producers tried to raise prices to $454/ton by Oct. 1. Price history is as follows: (U.S. East contract): 1970, $152; 1971, $158; 1972, $165; 1973, $170; 1974, $235 (30-lb); 1975, $260; 1976, $285; 1977, $305; 1978, $345; 1979, $375; 1980, $426; 1981, $453; 1982, $425; 1983, $425/$454.

MARKETS. U.S. newspapers bought 55.9% of their newsprint from Canada in 1983, down from 56% in 1982, 59.6% in 1981 and 70% in the early 1960s. Canadian newsprint producers are expected to supply only 55% of U.S. newsprint in 1984.

(News section continues on page 21)

SALES & EARNINGS

Recovery boosts third-quarter profits

U.S. pulp and paper companies climbed further out of the recession during the third quarter, with profits up a sharp 33.7% from depressed year-earlier levels and 12.7% from the 1983 second quarter, according to a *P&P* survey of 21 companies. Sales improved 11.7% over last year and were up 3.0% from the second quarter. Forest products companies reported third-quarter profits up 138.0% over 1982, according to reports from six companies, but earnings were down a disappointing 36.6% from the second quarter.

Strong volume gains continued for most paper grades, although pulp markets remained weak, and several price increases took effect late in the quarter, most notably for linerboard. We're "basically bullish about the future," said Champion International Corp. chairman and CEO Andrew C. Sigler. "Prices are moving up in all our businesses, costs have leveled off, and we're running full."

International Paper Co. reported net income of $66.9 million for the third quarter, up 106.5% from a year earlier. Crown Zellerbach Corp. posted third-quarter earnings of $22.3 million, up a healthy 201.4% from the 1982 quarter. St. Regis Corp. reported profits of $18.7 million for the quarter, down 62.5% from 1982.

Mead Corp. reported third-quarter income of $16.0 million, compared to a loss of $17.9 million in 1982. Union Camp Corp.'s $34.5-million net for the quarter was up 20.2% from last year.

Among tissue producers, Scott Paper Co.'s third-quarter net was $36.1 million, up 60.7% from 1982. Kimberly-Clark Corp.'s third-quarter profits of $43.5 million were down 19.4% from 1982, while Fort Howard Paper Co.'s quarterly earnings of $29.4 million were up 18.0% from 1982.

Price slump hurts wood products. While earnings improved greatly compared with the 1982 third quarter, most of the forest products companies surveyed reported earnings off from the 1983 second quarter. Georgia-Pacific Corp.'s net income of $3 million for the quarter compared to a loss of $1 million a year ago. Weyerhaeuser Co.'s third-quarter profits of $53.2 million were up 110.3% from last year. Champion International Corp. announced net profits of $24.5 million for the quarter, up 47.3% from last year. Boise Cascade Corp. posted earnings of $18.1 million for the third quarter, a whopping 624.9% increase over 1982. Louisiana-Pacific Corp.'s earnings of $4.4 million were up 578.5%.

Canadian mills post gains. Canadian pulp and paper companies in the third quarter continued to regain ground lost during the recent recession. The 10 companies surveyed by *P&P* reported an aggregate profit of C$31.3 million for the quarter, a substantial improvement compared to the loss of $38.6 million posted last year. Third-quarter sales of $2.37 billion were up 12.3% from a year earlier.

Price increases were pushed through for lightweight coated paper and uncoated free sheet during the quarter, and longer backlogs for uncoated groundwood papers were reported. But falling lumber prices cut into profits, while the strong U.S. dollar combined with Scandinavian competition slowed improvement in pulp markets.

U.S. PAPER/FOREST PRODUCTS RESULTS

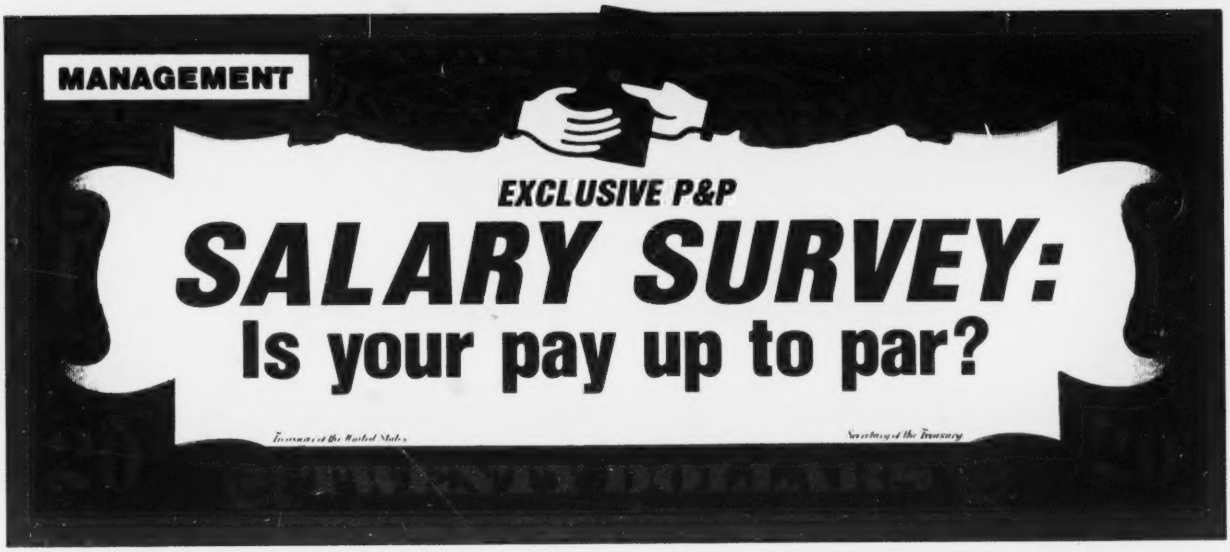
	Third quarter (000 dollars)			
Paper companies	**Sales**	**Change 1983/82**	**Earnings[1]**	**Change 1983/82**
Consolidated	$139,157	4.2%	$10,778	−0.5%
Crown Zellerbach	711,800	−5.0	22,300	201.4[2]
Federal Paper	131,932	15.0	2,252	−17.8
Fort Howard	224,490	48.7	29,410	18.0
Glatfelter	61,554	7.5	4,568	6.4
GN Nekoosa	385,500	8.0	16,600	−4.6
Hammermill	368,039	17.7	4,791	−19.7
Int'l. Paper	1,085,400	10.1	66,900[3]	106.5
James River (7/24)[4]	503,000	92.0	17,866	176.3
Kimberly-Clark	801,800	8.1	43,500	−19.4[5]
Longview (7/31)[4]	91,912	3.8	8,243	n.m.[6]
Mead	634,600	14.6	16,000	n.m.[6]
Pentair	73,078	11.1	2,860	9.5
St. Regis	737,717	7.1[7]	18,764	−62.5[8]
Scott	610,435	6.3	36,124	60.7
Sonoco	171,681	30.6	9,952	46.6
SW Forest	192,475	18.7	(2,350)	n.m.[6]
Stone Container	138,226	31.8	1,725	−14.7
Union Camp	469,076	25.2	34,541	20.2
Wausau (8/31)	50,462	13.9	1,369	1491.9
Westvaco	369,336	4.9	14,918	−9.2
Willamette	261,232	5.8	10,673	32.4
Total	**8,212,902**	**11.7**	**371,784**	**33.7**
Forest products				
Boise Cascade	909,480	23.5	18,050	624.9
Champion Int'l.	1,122,738	18.1	24,457	47.3[9]
Georgia-Pacific	1,709,000	20.2	3,000[10]	n.m.[6]
Louis.-Pacific	273,660	19.9	4,410	578.5
Potlatch	231,025	8.6	10,778	183.3
Weyerhaeuser	1,251,860	22.2	53,198	110.3
Total	**5,497,763**	**20.2**	**113,893**	**138.0**
U.S. total	**13,710,665**	**15.0**	**485,677**	**49.0**

CANADIAN PAPER INDUSTRY RESULTS

Abitibi	C$398,659	2.8%	C$7,055	0.7%[7]
B.C. Forest	226,600	22.3	(6,900)	n.m.
Con-Bathurst	335,900	−1.2	7,500	−20.2
Domtar	480,700	16.9	13,900	n.m.[6]
Donohue	89,400	22.6	2,300	35.3[7]
Fraser	111,521	10.1	2,323	n.m.[6]
Great Lakes	127,188	26.7	(352)	n.m.
Mac. Bloedel	497,000	16.4	600	n.m.[6]
Rolland	58,200	48.5	2,160	n.m.[6]
Scott	49,137	2.0	2,680	19.8
Total	**2,374,305**	**12.3**	**31,286**	**n.m.[6]**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. 1982 quarter includes CZ Canada interest sold effective Dec. 31, 1982.
3. Includes a pretax gain of $44.5 million from a land sale in Georgia.
4. Period ended. James River figures are first quarter; Wausau fourth.
5. 1982 quarter includes $8.3-million gain from woodlands sale.
6. Not meaningful due to loss in 1982 third quarter.
7. 1982 figures restated by company.
8. 1982 quarter includes about $38 million in pretax proceeds from sale of tax benefits and negative tax provision.
9. 1982 quarter includes approximately $7.2-million (13¢/share) gain from sale of land.
10. Includes pretax write-down of certain assets of $68 million and pretax gain of $10 million from the settlement of a energy contract dispute.

n.m. = not meaningful. ( ) = loss.



MANAGEMENT

EXCLUSIVE P&P

SALARY SURVEY:

Is your pay up to par?

A questionnaire in the September 1983 *P&P* asked readers for information on salaries, benefits, job satisfaction; tabulation is now complete

By KENNETH E. SMITH, Executive Editor

■ The September 1983 issue of *Pulp & Paper* contained a two-page, postage-paid reader survey form. Readers were asked for information on their salaries and benefits as well as opinions on their jobs, companies, the pulp and paper industry, and morale. The deadline for return of the forms was October 10, and the survey is now complete. Information contained on the survey forms was tabulated by an independent data processing service and is reported in this article and the accompanying tables.

Based on the survey responses, it seems that working conditions for professionals in the industry are still not too bad. In spite of the recession, the average respondent is reasonably well paid, stable, and happy at the job. He (96.3% of all respondents were males) probably works for a large wood products/pulp and paper company in mill operations, engineering, or technical service, located in either the Southeast or Midwest, and has a bachelor's degree in either mechanical or chemical engineering, chemistry, or paper science and technology.

Other interesting statistics from the survey are as follows:

Compensation—

- Median income of all respondents is $42,000
- Additional benefits received average $5,000 to $10,000
- Ten paid holidays and three weeks paid vacation are taken yearly on average
- Salary of respondents has been increased an average of twice in the last three years
- The last pay increase received by respondents averaged 8%
- 92.9% of respondents normally receive annual salary increases based on merit/performance (54.2%), cost-of-living index (3.5%), or both (31.5)
- 88% of all respondents are not paid overtime.

Personal—

- 99% of all respondents work full time; only 1.5% of these are self-employed
- 79.4% work for a wood products/pulp and paper manufacturer; only 12.7% are suppliers or consultants to the industry

TABLE 1: **Income distribution of respondents.**

	Income ($1,000) 1983
Lower decile	28
Lower quartile	34
Median	41
Upper quartile	52
Upper decile	65

TABLE 2: **Employee benefits.**

Benefits value ($1,000)	Respondents (%) 1983
0 to 1	0.5
1 to 2	4.2
2 to 3	6.7
3 to 4	7.7
4 to 5	6.8
5 to 10	32.4
10 to 15	21.8
15 to 20	10.0
20 to 50	9.0
Over 50	0.8

TABLE 3: **Benefits of respondents.**

Benefit	Respondents receiving benefits (%) 1983
Medical insurance	95.9
Life insurance	92.8
Profit sharing	26.6
Retirement pension plan	88.1
Company car	11.1
Bonus plan	23.9
Stock option plan	48.7
Dental insurance	80.8
Travel budget	24.6
Education allowance	49.6

- 44 hours is the average work week
- 64.7% have at least team or unit management responsibility
- Average work experience since leaving school is between 10 and 14 years
- 54.8% live in either the Southeast (29.6%) or the Midwest (25.2%)
- 33.7% are between 31 and 40 years old; 59.8% are between 31 and 50

MEDIAN INCOME *of all respondents is $42,000. Benefits average between $5,000 and $10,000.*

- 88.9% have at least a bachelor's degree
- 28.1% have additional advanced degrees
- Top bachelor's degrees are in mechanical engineering (18.6%), chemical engineering (17.3%), chemistry (14.5%), and paper science and technology (13.5%)
- 48.7% work for companies with sales of more than $1 billion
- 61.6% belong to a technical or professional society
- Only 17.3% changed employers within the last three years, and then only an average of once
- Average time with present employer is 11 years
- 59.8% have been in the pulp and paper industry their entire careers.

Morale—

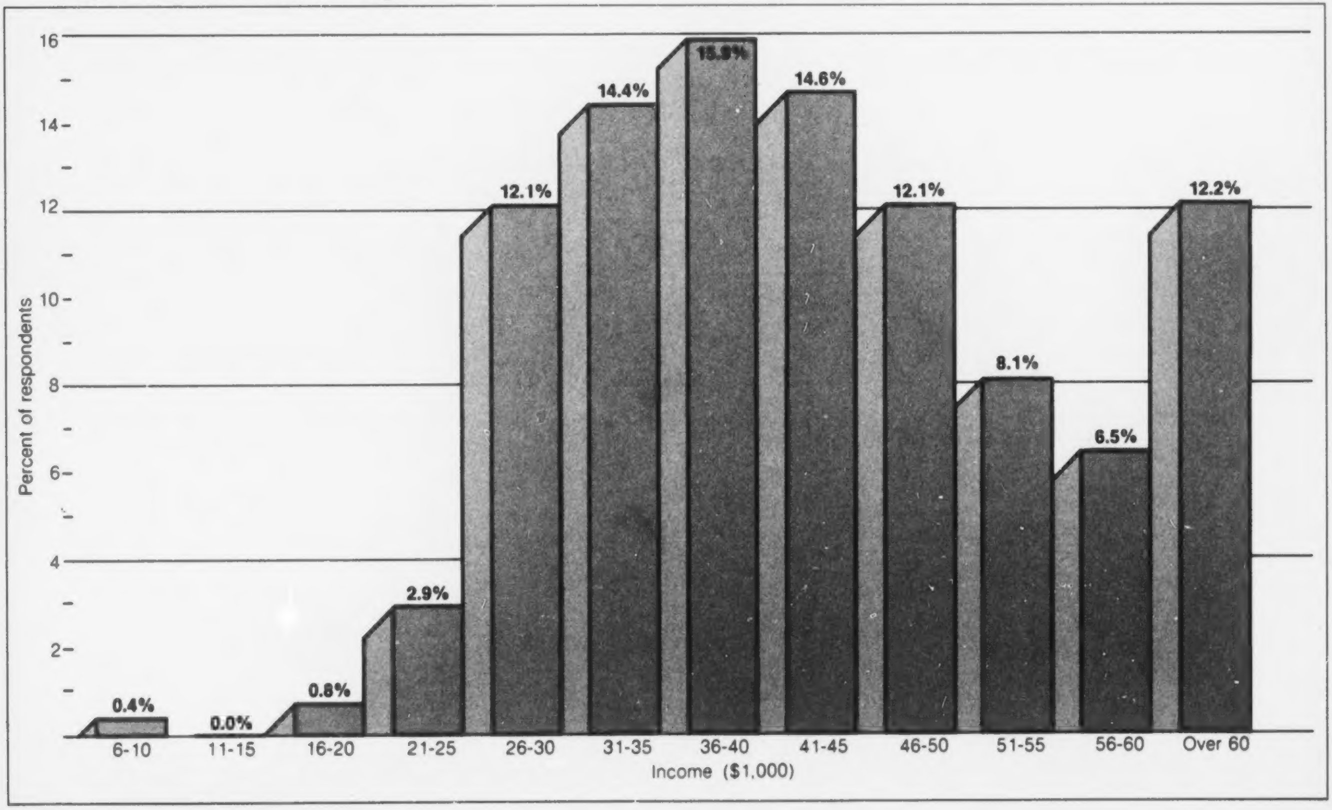
- On a scale of 1 (bad) to 5 (good), the average respondent ranks his job morale a 4 (above average)
- 88.1% say they like their jobs
- 83.2% say they would stay in the pulp and paper industry if they changed jobs
- 86.7% feel their companies listen to their input and value their experience.

SURVEY FOR ALL PROFESSIONALS. *P&P* has previously published articles on salaries of engineers within the industry—the most recent of which was the 1982 survey conducted by the Engineering Manpower Commission (EMC) of American Assn. of Engineering Societies and published in our May 1983 issue. However, this is the first exclusive compensation/opinion survey conducted by *P&P*.

The editors of *P&P* recognize that all professionals within the industry are not engineers. Therefore, this survey was designed to meet the needs and interests of all industry professionals. In fact, we found that more than 25% of all survey respondents have bachelor's degrees in disciplines other than engineering: 14.5% in chemistry; 7.1% in business; 3.6% in forestry/agriculture; 3.3% in liberal arts. Also, high school is the highest level of education for 7.3% of the respondents, and an associates degree is the highest level for 3.8%.

Tables 1 to 16 present survey data on compensation as compared with a number of variables such as degree, discipline, work type and experience, management level and experience, size and type of employing organization, etc. Although a few readers may not be able to find

FIGURE 1: **Income distribution of respondents.**



themselves represented by the data, we feel confident that the large majority of our readers will find useful data in this report. Income figures were obtained by adding any bonuses or additional income reported by respondents to their reported gross salary.

A word about benefits: survey respondents were asked to estimate the value of all benefits received by them as part of their compensation packages. Median values of these estimates as compared with certain variables are reported in Tables 4 to 7. Table 2 shows a breakdown of benefit values reported by respondents over certain ranges. However, the value of certain benefits such as company cars, life and medical insurance, and retirement plans is often hard to estimate, and this data may not be totally reliable. Therefore, Table 3, which lists tangible benefits usually received as part of compensation packages compared to percentage of repondents who receive each benefit, is probably a more valuable tool for comparison purposes.

88.1% OF ALL RESPONDENTS like their jobs.
83.2% would stay in the pulp and paper industry if they changed jobs.

ANALYZING THE DATA. Although each reader is capable of interpreting the tabulated data in this report to suit his or her individual interests, some observations are noteworthy. As previously mentioned, respondents reported an average of only two salary increases over the past three years while also noting that normally they receive annual salary reviews. This data obviously indicates salary freezes were widespread during the recession. Many respondent comments confirm this fact, and many people noted that benefits such as profit sharing and bonuses have also recently been reduced. Salary freezes will be discussed in further detail below.

The $42,000 median income of this survey's respondents compares very favorably with the $36,100 median income from the 1982 EMC survey of engineers in the paper industry. However, these two surveys are not from the same database—or the same year—and comparison may be misleading. The EMC survey reported a median income of $41,250 for engineers who are also supervisors, and $30,490 for nonsupervisory engineers. Median income for *P&P* survey respondents with no supervisory responsibility is $36,000, and $40,000 or more for respondents supervising at least one employee (see Table 16). Again,

TABLE 4: **Compensation and type of employment organization.**

Employing organization	**Income ($1,000)** **Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Median benefits**	**Respondents (%)**
Academic	30	30	39	39	50	4	0.2
Government	0	0	32	34	35	2	0.4
Wood/pulp/paper—engineering	30	34	41	50	61	6	14.8
Wood/pulp/paper—manufacturing	28	33	41	51	64	8	64.6
Consulting firm	33	41	50	59	70	5	6.1
Self-employed consultant	27	34	42	45	48	4	0.5
Wood/pulp/paper—supplier	30	37	45	56	65	7	6.6
Wood/pulp/paper—converter	28	32	40	53	63	10	2.5
Other	31	36	41	54	63	8	4.1

TABLE 6: **Compensation and size of employing organization.**

Organization's annual sales ($ million)	**Income ($1,000)** **Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Median benefits**	**Respondents (%)**
Less than 100	30	35	45	58	68	6	13.3
100 to 499	28	33	41	50	65	6	18.9
500 to 999	28	35	43	54	70	8	12.0
1,000 to 2,000	28	33	41	50	59	8	19.6
Over 2,000	30	35	43	53	65	8	29.1
Do not know	24	29	37	42	50	4	7.1

comparision of the two surveys is difficult, especially since *P&P* survey respondents include some supervisors who are not engineers.

Not surprisingly, the highest median income ($50,000) was reported by respondents whose main work function is administration. Salaries in sales and marketing ($48,000) and consulting ($47,000) followed close behind (see Table 5).

Table 7 shows that the median income of respondents directly corresponds to their level of supervisory responsibility—with corporate level management again topping the list.

Those respondents who reported consulting firms as their employment organization (Table 4) showed the highest median income at $50,000. Suppliers to the industry came in second highest at $45,000.

> *"UNION WORKERS tend to be favored at the expense of the salaried force."*
>
> —Technical service engineer, Southeast

Survey data showed no noticeable difference in median income or benefits between geographic regions in the U.S., and that breakdown is not included in this report. However, the median income of all Canadian respondents (3.6% of all respondents) was US$38,000.

No clear trend can be inferred from Table 6, which relates median income to the employing organization's annual sales, except that apparently those respondents who work for small companies make the most money, and those who do not know the amount of their companies' annual sales make the least.

The one major surprise of this survey is shown in Table 9. Respondents with bachelor's degrees in liberal arts lead all other disciplines in median income at $45,000. But, before anyone's ego is severely deflated, it should be noted that liberal arts respondents represent only 3.3% of all respondents. Therefore, this data may be misleading—or at least the deans of all those engineering schools out there hope so!

Three engineering disciplines—mechanical, chemical, and electrical—were tied with business for the second highest median income ($43,000).

Table 8 shows that median income increases with professional experience through 29 years of experience. However, past that point median income actually decreases. This phenomenon may possibly be explained by salary compression; i.e., salaries of recent graduates and young employees increase faster than those of older, more experienced personnel. And, in fact, several older

TABLE 5: **Compensation and principal work function.**

	Income ($1,000)						
Principal function	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Median benefits**	**Respondents (%)**
Administration	32	39	50	67	93	8	9.7
R&D	28	32	41	52	63	6	11.5
Consulting	31	40	47	55	65	7	4.6
Engineering design	30	35	41	50	60	5	15.7
Teaching/academic	30	30	30	42	42	0	0.1
Product development	28	29	40	50	55	10	2.1
Production and mill/plant operations	30	35	43	55	68	7	17.1
Engineering/maintenance	28	32	39	46	55	5	9.1
Sales and marketing	32	38	48	60	72	10	8.3
Technical service/quality control	28	29	36	43	50	7	14.4
Other	26	32	41	53	65	8	7.4

TABLE 7: **Compensation and level of supervisory responsibility.**

	Income ($1,000)						
Supervisory responsibility	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Median benefits**	**Respondents (%)**
None	25	28	33	42	51	5	13.6
Indirect or staff	28	31	37	45	54	6	21.7
Team or unit	29	33	39	44	53	6	14.1
Project or section	29	35	42	52	58	7	20.0
Major department or division management	35	41	50	60	75	9	25.3
Corporate management of organization	40	48	64	91	125	12	5.3

survey respondents did comment on this salary compression problem.

Job hopping apparently does pay, according to Table 13. Respondents who have had five full-time employers in their careers have a median income of $49,000, compared with $37,000 for respondents who have had only one employer.

The majority of respondents seem to have done at least a little job hopping since 67.4% have had more than one employer. Salary compression or other factors may explain the drop to a $42,000 median income for those who have had six or more employers.

RESPONDENTS COMMENT. The survey form included a space for comments, and many interesting ones on several issues were received. The overriding theme of many comments was that, "although working conditions and job satisfaction are still decent, things will be better when the industry is completely recovered from the recession."

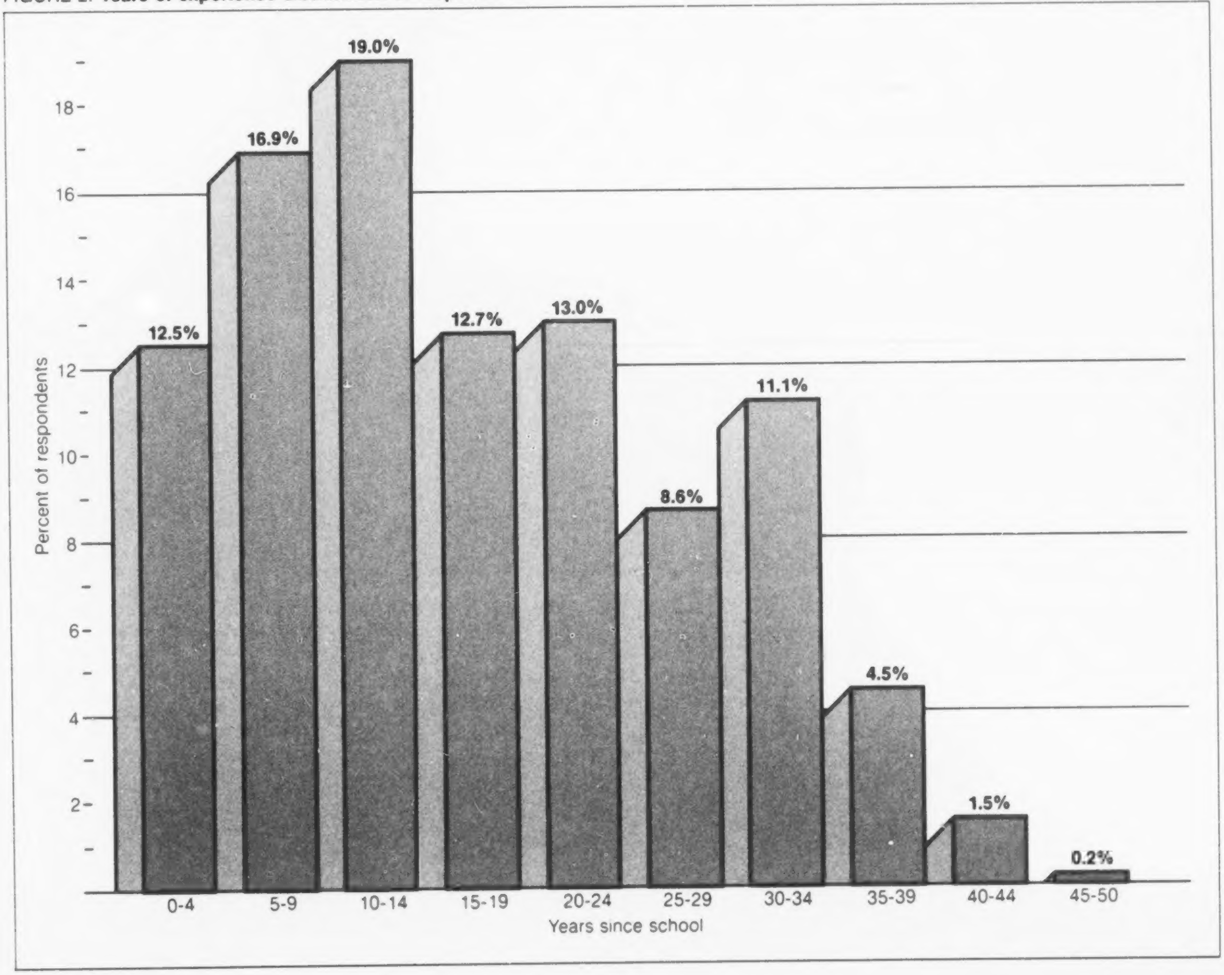
A chemical engineer working in mill operations in the Southeast summed up the feelings of many respondents by saying, "Today I have about double the responsibility and authority of two years ago but only 4% more salary. The bonus program is frozen, so my net pay is less." This respondent went on to address the major concern voiced by many respondents who reported low job morale. "Meanwhile, the hourly people's pay has increased 24% over the past two years, and they are ahead of both me and my supervisors. I hope this situation is corrected soon."

This particular concern is not new to the current recession—especially among production supervisors in the industry—but it was voiced by many of our readers who said they are unhappy because they have had their salaries and benefits cut or frozen recently, while hourly workers at their companies continued to receive pay in-

TABLE 8: **Income and professional experience.**

Years since school	Median income ($1,000) All respondents	Respondents (%)
0 to 4	29	12.5
5 to 9	35	16.9
10 to 14	41	19.0
15 to 19	46	12.7
20 to 24	50	13.0
25 to 29	51	8.6
30 to 34	48	11.1
35 to 39	50	4.5
40 to 44	53	1.5
Over 44	36	0.2

FIGURE 2: **Years of experience distribution of respondents.**



creases according to union contracts.

A pulp and paper technology graduate working in technical service at a southeastern mill said, "Union (hourly) workers tend to be favored at the expense of the salaried force. In some areas, the salaried supervisor makes less than the hourly people he supervises. Also, hourly workers received a 7% raise this year while salaried workers had a freeze."

A civil engineer in engineering/maintenance at another southeastern mill commented,"My current morale and outlook are poor. Current market and economic conditions have caused my employer to ask for more work at the same pay. Sacrifices by salaried employees have not been rewarded, while union workers have continued to demand and receive increases in both wages and benefits."

A mechanical engineer in the Midwest noted, "Management treats the union with kid gloves." Similar comments were received from respondents in many different disciplines and geographic areas.

Of course, not all the comments received were negative. A vice president of production for a midwestern

TABLE 9: **Income and educational field (Bachelor's degree only).**

	Income ($1,000)					
Discipline	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**Respondents (%)**
Forestry/agriculture	24	32	40	49	58	3.6
Chemistry	28	33	40	50	60	14.5
Mechanical engineering	31	36	43	55	66	18.6
Chemical engineering	29	34	43	53	64	17.3
Civil engineering	30	35	40	51	63	4.6
Electrical engineering	31	35	43	54	62	7.0
Industrial engineering	32	37	41	52	58	2.6
Mathematics/physics	30	36	40	50	54	1.8
Computer science	23	23	42	42	50	0.2
Biology/life science	25	25	34	42	49	1.3
Paper science and technology	27	30	38	47	64	13.5
Environmental science	26	41	42	46	46	0.5
Business	30	33	43	54	71	7.1
Liberal arts	30	44	49	68	98	3.3
Other	30	35	45	52	55	4.0

TABLE 10: **Income, professional experience, and educational level.**

		Income ($1,000)				
Years since school	**Highest degree**	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**
0 to 4	B.S.	28	28	31	33	36
	M.S.	28	34	37	38	40
	Ph.D.	26	28	32	36	46
5 to 9	B.S.	27	32	36	41	45
	M.S.	35	37	42	45	54
	Ph.D.	34	37	47	51	57
10 to 14	B.S.	32	35	42	47	55
	M.S.	38	40	50	57	65
	Ph.D.	32	36	41	48	53
15 to 19	B.S.	36	41	46	58	60
	M.S.	30	48	52	60	71
	Ph.D.	37	40	52	56	56
20 to 24	B.S.	36	42	49	52	64
	M.S.	24	46	55	65	91
	Ph.D.	37	47	52	60	88
25 to 29	B.S.	42	51	58	65	84
	M.S.	39	39	52	57	69
	Ph.D.	42	50	57	70	87
30 to 34	B.S.	31	43	48	63	66
	M.S.	44	49	54	62	73
	Ph.D.	40	40	66	66	74
35 to 39	B.S.	36	36	56	64	80
	M.S.	48	48	50	50	78
	Ph.D.	0	0	0	0	0

pulp and paper company wrote, "I think paper is the best industry you can get into. There will always be work and opportunity for anyone who wants it. The sky is the limit!"

A purchasing manager for a southeastern pulp and paper company with an income of $75,000/year says, "I have the best job in the industry. I could not be treated any better than I am."

> "THERE IS DEFINITE discrimination against older employees. They receive . . . demotions without regard for seniority. . . ."
>
> —Mechanical engineer, Northeast

A few of our older readers voiced their concerns about salary compression and age discrimination. One chemistry major currently working at the northeastern corporate headquarters of a pulp and paper company said, "There is definite discrimination against older employees. They receive lateral shuffles and demotions without regard for seniority or experience."

A mechanical engineer who is employed at another northeastern pulp and paper company summed up a predicament that may be typical for many older employees who are dissatisfied with their present job. "I'm too old to make a change. You reach a point in life where you can't afford to move because of pension, insurance, etc. It's a living; better than unemployment. You do the best job you know how for personal satisfaction."

We also heard from a few of our female readers about their particular problems. One female R&D engineer in the Northeast with a masters degree in pulp and paper technology said, "This is a tough industry for women! I'm not interested in being 'one of the boys' yet then it's difficult to be taken seriously."

A female biology/life science major employed in technical service at a northwestern mill noted, "We need more women in the industry."

PRINTER ERROR. Apparently, due to printer error, some readers did not receive a tear-out survey form or postage-paid envelope in their September issue of *P&P*. We apologize for this error and thank those readers who mailed in surveys in spite of this inconvenience. This survey will be repeated in 1984, probably in the August issue, and we look forward to hearing from all of

TABLE 11: **Income, professional experience, and educational field (Bachelor's degree only).**

Years since school	Income ($1,000) Forestry/agriculture	Chemistry	Mechanical engineering	Chemical engineering	Civil engineering
0 to 4	30	29	30	28	30
5 to 9	24	36	35	35	35
10 to 14	39	39	41	44	39
15 to 19	35	42	48	50	51
20 to 24	44	43	50	53	48
25 to 29	48	44	61	50	59
30 to 34	46	50	50	51	49
35 to 39	75	53	56	52	57
40 to 44	53	92	50	55	0
Over 44	0	0	27	0	0

TABLE 12: **Income and number of years with current employer.**

Years	Median income ($1,000)	Respondents (%)
5 or less	34	11.3
6 to 10	34	17.0
11 to 15	34	21.0
16 to 20	37	16.7
21 to 25	40	15.9
26 to 30	39	10.2
31 or more	41	7.7

TABLE 13: **Income and number of full-time employers.**

Employers	Median income ($1,000)	Respondents (%)
1	37	32.6
2	42	31.0
3	42	18.0
4	46	9.0
5	49	5.7
6 or more	42	3.7

TABLE 14: **Income and type of wood/pulp/paper company.**

Type	Median income ($1,000)	Respondents (%)
Wood products	39	2.6
Pulp/paper/paperboard	39	61.6
Woodlands operations	31	2.4
Chemical byproducts	42	0.8
Corporate or administration	48	19.1
R&D	41	13.5

our readers then.

Reader comments or suggestions on how the survey can be improved are always appreciated. Comments can be sent to:

Kenneth E. Smith, Executive Editor, Pulp & Paper,
2700 Cumberland Parkway N.W., Suite 530,
Atlanta, Ga. 30339. ■

> *"I THINK PAPER is the best industry you can get into. There will always be work and opportunity for anyone who wants it. The sky is the limit!"*
>
> *—Vice president of production, Midwest*

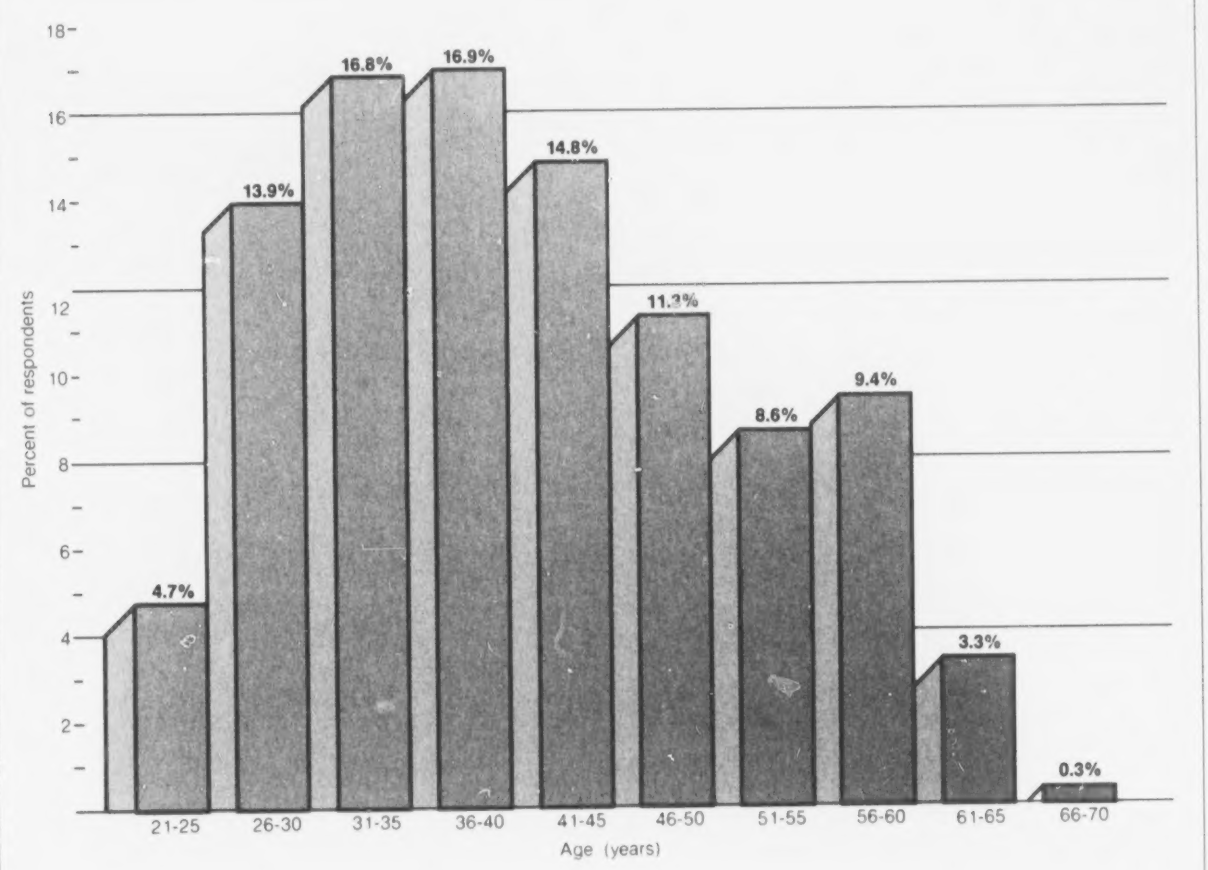
TABLE 15: **Income and number of years management experience.**

Years	**Median income ($1,000)**	**Respondents (%)**
None	32	11.7
5 or less	37	15.7
6 to 10	40	13.9
11 to 15	38	12.3
16 to 20	42	17.6
21 to 25	45	10.7
26 to 30	46	8.4
31 or more	44	9.8

TABLE 16: **Income and number of employees managed.**

Employees	**Median income ($1,000)**	**Respondents (%)**
None	36	24.1
1 to 5	40	23.8
6 to 20	40	21.4
21 to 50	41	17.3
More than 50	42	13.4

FIGURE 3: **Age distribution of respondents.**



ISSUE FOCUS:
Mill Maintenance

Dynamic pump seals reduce mill's bearing losses, maintenance costs

Replacing packed stuffboxes with dynamic seals has virtually eliminated pump failures at Weyco mill; little maintenance is required

By BRUCE HOFFENBECKER

■ Considering how long centrifugal pumps have been in use, it is surprising that most are still sealed with packed stuffboxes. Packing a pump requires both skill and knowledge to obtain the maximum life from both the packing material and the shaft sleeve. Conventional packing requires too much maintenance time and money, but the lack of it can be just as disastrous. Failure of bearings due to gland water or product leakage along the shaft into the bearing frame housing (with subsequent contamination of the lubricant) is the usual result of packing failure. Frequent readjustment of both the gland and the gland water is necessary to minimize product leakage and dilution.

Mechanical seals are also used on centrifugal pumps. These devices, installed in the stuffing box, have two sealing faces. One is held stationary by the stuffbox and the other is secured to the shaft and rotates along with it. The sealing faces are finely lapped and kept in contact by compression springs, thus preventing leakage. Because of the precision involved in their manufacture, these seals can be very expensive. This relatively high cost is also due to the material used for the sealing faces. Carbon used with ceramic is the most common and cheapest material and tungsten carbide is the most expensive. Precise installation of mechanical seals is critical to prevent premature failure. Even properly installed mechanical seals can fail without warning.

Certain conditions directly affect the life of a seal, whether a packed stuffbox or a mechanical seal. Proper alignment of the pump's coupling is a must. Shaft runout at the seal area should not exceed 0.002 in. as the radial motion will cause excessive wearing of the seal faces. The same radial motion will deform conventional packing, in either case leading to premature seal failure. Operating to either side of the best efficiency point on a pump curve causes increased shaft deflection with the same radial motion effects. Axial motion from a loose thrust bearing fit or misalignment can cause premature mechanical seal failure. Gland or flush water must be properly applied to each seal when pumping slurries.

Where these methods of sealing are not adequate, a method known as dynamic sealing can be used. Although not a new technology (Allis-Chalmers Corp. had its Equiseal on the market in the 1940s), it is one being rejuvenated in view of environmental concerns, energy costs, product costs, and effluent treatment costs, not to

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Mr. Hoffenbecker is senior maintenance engineer, Weyerhaeuser Co., Rothschild, Wis.

TABLE 1: **Average annual cost comparisons of titanium dioxide pump (30% solids).**

	Packed stuffbox	Dynamic seal
Effluent treatment	$ 750	$ 0
Bearing frame rebuild	650	0
Packingcosts (material)	75	0
Sleeve costs	250	100
Replace lip seal	0	100
Seal water	200	0
Product loss	15,000	75
Millwright labor	1,000	150
Housekeeping labor	500	25
Oiler labor	500	25
Totals	$18,925	$475

TABLE 2: **Average annual cost comparisons of paper stock pumps (1.5% to 5% consistency).**

	Packed stuffbox	Dynamic seal
Effluent treatment	$2,100	$ 5
Bearing frame rebuild	850	0
Packingcosts (material)	100	0
Sleeve costs	350	0
Replace lip seal	0	0
Seal water	550	15
Product loss	500	0
Millwright labor	1,000	0
Housekeeping labor	500	0
Oiler labor	500	30
Totals	$6,450	$50

mention maintenance costs. These seals are available from several pump manufacturers for pumping chemicals, slurries, pulp and paper stock, and many other liquids. They come in one, two, or even three stages to seal against static suction heads up to 140 ft (at 3,500 rpm).

DYNAMIC SEALING. A dynamically operated seal in a centrifugal pump (see Figure 1) uses an auxiliary radial van impeller, often called an expeller or repeller in a modified stuffbox. When in operation, the auxiliary impeller rotates along with the main pump impeller, its centrifugal forces acting against the static suction head of the liquid in the stuffing box area as well as back pressure developed by the impeller. This creates an equilibrium point and prevents leakage.

After the pump is shut down, a static seal is employed. Several types of static seals are available, depending on the options offered by each manufacturer of dynamic seals. These options include the mechanical seal, use of the flyweight principle, packed stuffbox, and the lip seal.

Mechanical seal. A mechanical seal used in this application would function when the pump is shut down. On startup, pneumatic or hydraulic pressure is applied to built-in seal bellows that open the sealing faces, thus minimizing face wear. When the pump is shut down, the pressure is relieved and the mechanical seal faces close.

The main advantage of this type of static seal is its ability to virtually eliminate product leakage. However, disadvantages may outweigh the advantages, depending on the liquid being pumped. Use of a bellows-operated mechanical seal requires an air or hydraulic supply, filter, regulator, solenoid valve, delay timer (optional), and an electric hookup to the motor or starter. These requirements, along with the cost of a special mechanical seal, result in a relatively major expense plus maintenance costs incurred later on. In addition, liquids with heavy solids (slurries) can set up in the mechanical seal area while the pump is shut down, causing accelerated wear on startup.

Flyweight principle. This type of static sealing utilizes the centrifugal forces of a flyweight mechanism to open sealing faces on startup and close them on shutdown. The result is an excellent static seal. The main disadvantage is cost, along with maintenance to rebuild the pins and linkages of the flyweight mechanism. Guarding of the rotating flyweights is essential to safety.

Packing rings. This conventional means of sealing is very basic. It requires an external source of water for packing cooling and lubrication, which can cause product dilution, leakage, and eventually lead to lubrication contamination and bearing failure. Furthermore, some of the recommended packing material can cost as much as $100/lb or more.

Lip seal. A lip seal, usually of special design, is the simplest and most economical means of static sealing. It requires no external source of air, water (except on some paper stock applications where it is recommended to prevent stock dewatering within the seal area), or electricity. Both radial lip and axial contact seals are available. The radial lip seal usually wears more quickly, necessitating periodic inspection and/or replacement.

MILL APPLICATIONS. At Weyerhaeuser Co.'s pulp and paper mill at Rothschild, Wis., 31 pumps (16 process and 15 paper stock pumps) fitted with dynamic seals have accumulated over 50 pump-years of operation.

Most of these pumps were modified with dynamic seal kits, some installed in as little as 2.5 hours. All are equipped with static lip seals (stock pumps use a polished rotating collar against a stationary axial contact rubber seal), and all but one are single-stage seals.

A pump handling titanium dioxide (30% solids) and previously equipped with a standard stuffbox required constant maintenance. Packing was being replaced about every two to four weeks, with readjustment every other day. Shaft sleeves were being replaced about every four to six months, and bearings had to be replaced about as often due to lubrication contamination from gland leakage. Maintenance and housekeeping costs totaled more than $5,000/year, while product losses were

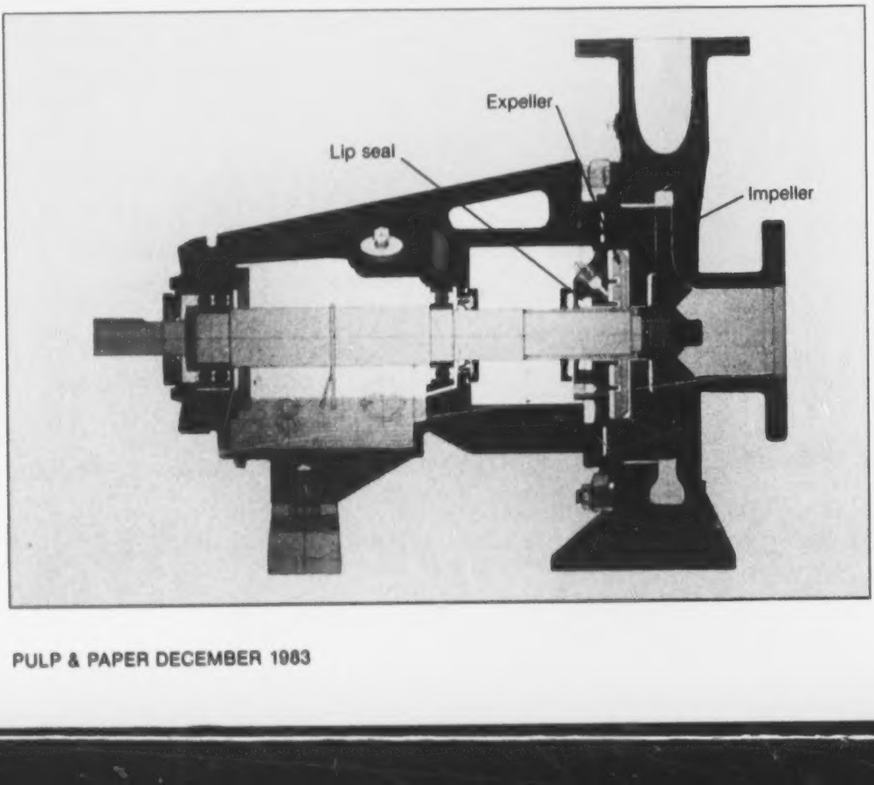

FIGURE 1: **Process pump with single-stage dynamic seal.**

TABLE 3: **Average annual cost comparisons of process pumps.**

	Packed stuffbox	Dynamic seal
Effluent treatment	$ 950	$ 10
Bearing frame rebuild	640	80
Packingcosts (material)	60	0
Sleeve costs	240	10
Replace lip seal	0	30
Seal water	300	5
Product loss*	2,000	15
Millwright labor	900	40
Housekeeping labor	480	0
Oiler labor	500	20
Totals	$6,070	$210

*Includes TiO_2 pumps.

estimated at more than $15,000. Even greater product losses occurred with another pump handling titanium dioxide at 70% solids.

Both pumps have been in continuous operation for two years since being equipped with dynamic seals. Product leakage has been almost nonexistent, no product dilution has occurred, and maintenance costs have been substantially reduced. The only required maintenance has been to change the static lip seals twice on each pump due to the abrasiveness of the titanium dioxide. Plugging has occurred on three occasions—once due to a power failure, once due to a faulty suction valve that allowed the product to enter the pump and seal area after the pump was shut down and flushed, and once due to a failure to flush the pump after a shutdown.

Other process pumps are handling clay, lime, and starch slurries, along with whitewater. A pump that handles a starch slurry at 125°F has been operating continuously for three years without any leakage and with no maintenance performed. Prior to installation of the dynamic seal, maintenance costs alone were estimated at more than $3,000/year, not counting product losses. These were estimated at another $3,000+/year.

The paper stock pumps, which handle consistencies up to 5%, have accumulated more than 18 pump-years of operation with no maintenance performed on any of the seals. These pumps, however, are supplied with 3 to 5 gal/hour of gland water to prevent stock from dewatering within the seal area and plugging the expeller vanes. The savings in effluent treatment, maintenance, and housekeeping costs average to over $5,000/year/pump, not including product losses.

Since dynamic seals have been installed, no bearings have been lost due to failure of the dynamic seal. Routine pump maintenance, such as tightening packing glands, draining water out of the lubricant as a result of gland leakage, cleaning up paper stock or other product loss from the floor area, repacking pumps, overhauling pumps (i.e., changing sleeves, bearings, etc.), and readjusting gland water valves to minimize gland water and product losses, is no longer required on those pumps equipped with dynamic seals. In fact, the only necessary maintenance performed, other than unplugging, has been the replacement of eight lip seals—half of these on the two titanium dioxide pumps—in more than 50 pump-years of operation. ■

STONE CONTAINER DOUBLES CAPACITY

(Continued from page 67)

vate landowners and investing its capital in manufacturing facilities. "We think the return from manufacturing operations is higher than from timber ownership—unless that land was purchased a long time ago," Mr. Stone asserts.

Continental will supply its former brown fiber mills with timber over the next five years at the same rate that they were supplied on average over the past three years. For the next five years after that, CFI has agreed to supply its former mills at a 20%/year declining rate—for a total commitment of ten years. A similar agreement has been reached regarding woodchips from Continental's sawmills, and Stone Container has right of first bid on CFI's timberland and sawmills, if they are ever put up for sale.

HOW THE DEAL WAS FINANCED. A portion of the $510-million purchase price for the CFI operations was paid by assumption of about $120 million of long-term debt, of which $114 million is represented by tax-exempt obligations with a weighted-average interest rate of about 6%. Those obligations have only nominal scheduled principal payments for the next few years, with principal amortizations extending as far as the year 2016. The balance of the purchase price was paid in cash at the closing. The transaction includes the transfer to Stone Container of net working capital related to the acquired operations.

"Stone Container financed the transaction by means of a $600-million credit facility arranged with a group of banks," explains Arnold F. Brookstone, senior vice president, chief financial and planning officer. The bank financing consists of a $400-million, 7.5-year term loan, with no principal payments until September 1986, and a $200-million, 2.5-year revolving credit. The revolving credit is convertible, at the company's option, into a 5-year term loan, whose period coincides with the last 5 years of the $400-million loan. "At appropriate times and under favorable market conditions, we plan to fund a portion of the bank financing through the issuance of equity and other securities," according to Brookstone.

"Our financing plan is conservative and provides the company with essential financial flexibility and staying power," Brookstone states. He estimates capital spending over the next two years will total only about $70 million because both Stone Container and CFI have continuously invested in modernizing their plants.

Earlier this year Stone Container raised $37.5 million through its first equity offering since going public in 1947, reducing the Stone family's holdings in the company from 57% to 49%. The company also hired its first president from outside the Stone family, James E. Frew, group vice president of Georgia-Pacific Corp.

Mr. Stone declined to discuss how CFI's management would be combined with Stone Container's but notes that "a lot less restructuring will be required than most people expect. We are excited about the Continental people joining the company and look forward to significant future growth." ■

TiO_2 consumption improves but imports still rising

By BARRY SHOCKETT

Although titanium dioxide (TiO_2) production fell to 650,000 tons in 1982, about 30,000 tons more than originally predicted, the economic recovery this year is expected to boost output to near the 1980 figure. However, imports are forecast to grow more than 18% in 1983 (see below), following an 11% increase last year. Combined shipments from Canadian and European sources made up 19% of total demand in 1982 and could easily reach 20% this year.

U.S. statistics for titanium dioxide (000 short tons)

	1980	1981	1982	1983e
Capacity	1,000	1,005	950	905
Production	727	750.5	650	725
Imports	98	125	139	165
Exports	42	61	68	80
Apparent consumption	783	814.5	721	810

Source: Bureau of Census, U.S. Dept. of Commerce.

Canadian statistics for titanium dioxide (000 short tons)

	1980	1981	1982	1983e
Capacity (nameplate)	79.4	82.7	82.7	82.7
Production	78.8	78.8	79.4	82.7
Imports	6.9	8	7.1	8.8
Exports	14.3	15.4	22	24.3
Apparent consumption	71.4	71.4	64.5	67.2

TITANIUM DIOXIDE

UNITED STATES

Uses: Rutile and anatase grades of TiO_2 are used as fillers and coating pigments by the paper industry in printing/writing papers and paperboard. The largest end use is in paints (50%), followed by plastics (12%), rubber, ceramics, and various other applications.

Demand: In 1982, the paper industry consumed an estimated 172,000 tons—off 6% from the previous year—accounting for almost 24% of total TiO_2 demand. Recovery of both coated paper and paperboard from last years' poor performance resulted in overall industry usage increasing to an estimated 190,000 tons in 1983.

Sources: The remaining five U.S. producers, in declining order of capacity, are: E.I. DuPont, SCM, American Cyanamid, Kerr-McGee, and Gulf + Western. SCM strengthened its number two spot by acquiring G + W's Ashtabula, Ohio plant, which it intends to expand approximately 22%. Kerr-McGee's Hamilton, Miss., facility is also undergoing an expansion due to be completed in next year's third quarter. G + W's remaining plant in New Jersey is reportedly up for sale.

Availability: No shortage of TiO_2 is anticipated in the foreseeable future, as operating rates remain at the 80% level. 1983, market; 1982, market; 1981, market; 1980, market; 1979, anatase, market; rutile, tight.

Pricing: List prices for both anatase and rutile grades were steady throughout 1983, although selling prices were down between 10¢-15¢/lb for most of the year. However, one producer introduced a 1.5¢/lb boost on market prices for the fourth quarter and announced plans for quarterly hikes until mid-1984, the amounts to be decided by the marketplace. Pricing history: 1983, anatase, 70¢/lb, delivered; rutile, 75¢/lb; 1982, anatase, 70¢/lb; rutile, 75¢/lb; 1981, anatase, 58¢-70¢/lb; rutile, 63¢-75¢/lb; 1980, anatase/rutile, 57¢/lb; 1979, anatase, 53¢/lb; rutile, 59¢/lb; 1978, anatase, 46¢/lb; rutile, 52¢/lb.

Forecast: Demand for TiO_2 is expected to continue to improve both domestically and on a worldwide basis. Offshore improvements should result in a drop in imports, which in 1983 were predicted to reach an all-time high of 165,000 tons.

CANADA

Uses: About 90% of the anatase TiO_2 used by the paper industry is used by fine paper mills, with paperboard applications accounting for the rest. The paint industry is the largest dioxide consumer (57.5%), followed by plastics (16%), and rubber and miscellaneous (14%).

Demand: Paper industry usage in 1982 was 7,700 tons (as predicted), 500 tons more than in the previous year. In 1983, mill consumption should rise about 7%, to 8,300 tons—12% of total TiO_2 demand. In 1983, imports are expected to be close to 9,000 tons, compared with the 7,000 tons last year.

Sources: The two domestic producers are NL Chem Canada and Tioxide Canada. In 1982, 54% of the imports (11% of total demand) were from the U.S., the balance coming from Europe.

Availability: Despite the high operating rate of close to 100%, any increased domestic demand could be satisfied by reducing exports until new capacity comes on stream. 1983, anatase, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: List prices for untreated anatase have remained steady since January 1982. A 2¢/lb discount was applied in February this year, slated for removal in the third quarter. Pricing history: 1983, 80¢/lb, bags, delivered; 1982, 74.5¢-80¢/lb; 1981, 69¢-74.5¢/lb; 1980, 59¢-69¢/lb; 1979, 48.5¢-59¢/lb. Slurry shipments are 0.5¢/lb extra.

Forecast: TiO_2 demand by the paper industry is forecast to increase on average 8%/year until 1987, while dioxide consumption will grow between 7.5% to 8%/year during the same period.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

NOTE

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JAN

1984

PULP & PAPER
January 1984

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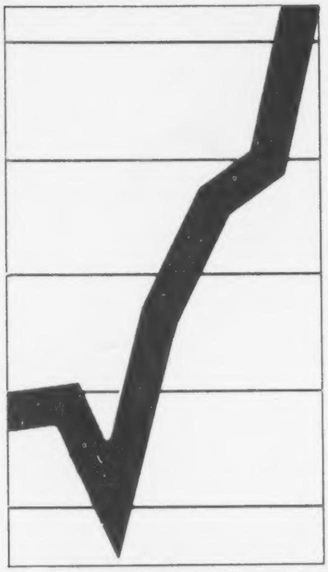
Fraser ups stake in sulfite pulp 64

PULP&PAPER

Volume 58 Number 1 January 1984



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COVER: James River's Robert C. Williams (left) and Brenton S. Halsey check the operation of an 1880's-vintage blotter paper machine at their 26-tpd Hollywood (Richmond, Va.) mill. This mill was the foundation from which they built James River into a $2-billion/year giant. An exclusive interview with Halsey and Williams begins on page 57.
(Photo courtesy of James River.)

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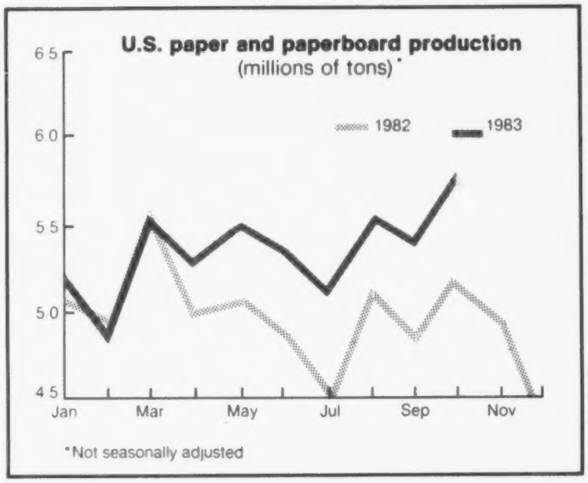
MONTH IN STATISTICS

U.S. paper and paperboard production in October totaled a record 5.83 million tons, up 12.2% from October 1982, according to the American Paper Institute. Both paper and paperboard production totals set new monthly highs in October, API added, with paper up 10.7% from last year and paperboard up 12.2%. The September-October two-month moving average of seasonally adjusted data moved up to a record 68.2 million tpy.

Among major grades, printing/writing papers are primarily responsible for record paper production. Production data now point to new records in 1983 for coated paper and uncoated free-sheet papers, with both up 10% from 1981 levels. Tissue, up 10.5%, and kraft packaging and industrial papers, up 7.3%, also showed continued strong growth in October. Paperboard production in October was up even more sharply than paper, with strong gains in every grade. Corrugated box shipments through October rose 11.7% over 1982, said the Fibre Box Assn.

Canadian newsprint shipments in October totaled 764,000 metric tons, a gain of 11.7% over October 1982, according to Canadian Pulp & Paper Assn. data. Newsprint mill operating rates stood at 88%, up from 79% last October.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
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Newsprint	October	448	—	5,156	0.7
Uncoated groundwood (s)	October	142	2.9	1,502	2.8
Coated paper (s)	October	527	16.9	5,671	12.5
Uncoated free sheet (s)	October	767	13.8	8,676	10.3
Unbleached kraft packaging and industrial (s)	October	338	7.3	3,794	3.0
Tissue	October	420	10.5	4,777	8.0
Total paper	**October**	**2,939**	**10.7**	**32,827**	**7.5**
Kraft linerboard, unbleached	October	1,344	12.8	15,072	10.5
Semichemical medium	October	423	11.9	4,713	6.5
Bleached paperboard	October	348	14.1	3,904	5.0
Recycled paperboard	October	678	17.1	7,227	9.7
Total paperboard	**October**	**2,888**	**13.7**	**32,017**	**8.7**
Total paper and paperboard*	**October**	**5,827**	**12.2**	**64,844**	**8.1**
[illegible]					
Total woodpulp production	September	4,418	15.0	52,157	4.7
Market pulp production	September	533	23.7	6,414	10.1
Wastepaper consumption at paper/board mills	September	1,188	5.9	14,193	5.4
Pulpwood consumption (cords)	September	7,203	9.1	85,200	7.6
[illegible]					
Corrugated box shipments (billion ft²)	October	23.476	11.7	211.897†	6.8
Containerboard inventories at box plants	Oct. 1	2,339	−2.3		
[illegible]					
U.S. paper imports (including products)	September	741	12.8	8,696	9.5
Imports of Canadian newsprint	September	537	11.0	6,679†	3.6
U.S. paper exports (including products)	September	387	2.1	4,609	7.4
Exports of unbleached kraft linerboard	October	157	5.4	2,207	12.2
Exports of woodpulp	September	329	10.4	3,592	2.6
[illegible]					
Total newsprint shipments	October	764	11.7	6,952†	4.7
Operating rates	October	88%	79%	84%	83%
Inventories held by U.S. consumers	Oct. 31	1,260	−7.2		
Woodpulp shipments (export only)	October	575	45.9	5,549†	15.4
Operating rates	October	87%	75%	84%	78%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Linerboard: Strong demand, limited capacity growth may mean 97% rates

Statistics	**1982**	**1983e**	**1984e**
Production, 000 tons	13,494	14,860	15,985
Capacity, 000 tons	16,032	16,266	16,430
Utilization rates, %	84.2	91.3	97.3
Imports, 000 tons*	25	40	60
Exports, 000 tons*	1,819	2,120	2,300
Apparent U.S. consumption			
000 tons	11,700	12,780	13,745
lb/capita	100.9	109.3	116.3
000 tons/$billion real GNP	7.88	8.32	8.51

e=estimate *Commerce Dept. data

GRADE STRUCTURE: Unbleached linerboard is made in a wide range of basis weights. Standard weight in the U.S. is 42 lb/1,000 ft², but other important weights are 26, 33, 69, and 90 lb. Major use is in domestic corrugated container production, although about 13% of output is exported. About 300,000 tons of recycled "test" liner is produced in the U.S. but is excluded from these figures.

PRODUCTION/CAPACITY: Unbleached kraft liner production rebounded with the U.S. economy in 1983, reaching a new high of about 14.86 million tons, up 10.1% from 1982. The surge reflected a sharp pickup in domestic box shipments and strong export demand despite the continuing strength of the U.S. dollar and slower economic recovery overseas.

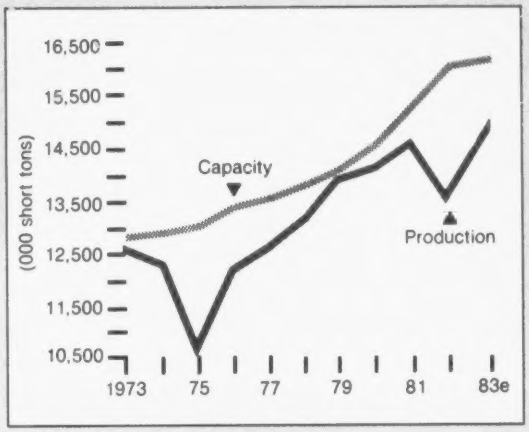
Corrugated box shipments in 1983 set a new record of around 252.1 billion ft², up 7.2% from the previous year and exceeding the previous peak of 250.6 billion ft² reached in 1979. U.S. export shipments of unbleached kraft liner in 1983 rose about 16.5% to 2.1 million tons.

The latest American Paper Institute survey shows linerboard capacity rising only 1.0% to 16.4 million tons in 1984 and by only 1.5%/year over the entire 1984-86 period, to 17.0 million tons. This includes a proposed new 280,000-tpy mill for which financing is still uncertain but excludes a new machine recently announced by Chesapeake Corp. of Virginia which will add about 83,000 tons in net capacity in 1986.

OUTLOOK: The outlook for kraft linerboard is bright in 1984, with production forecast to rise 7.6% to nearly 16.0 million tons and limited capacity expansion. This should result in operating rates of about 97% compared with 91% in 1983 and 84% in 1982.

Corrugated box shipments are forecast to rise 7.0% to 269.7 billion ft² this year, based on 7% to 8% growth in U.S. industrial production. This should translate into domestic liner demand of about 13.5 million tons in 1984. Linerboard inventories at box plants and mills are projected to drop 100,000 tons in 1984 following a nearly 200,000-ton drop during the past year.

Export shipments are projected to rise 8.5% to 2.3 million tons in 1984, with further strengthening of Western European and Far Eastern economies and some slight weakening of the U.S. dollar.



Estimated annual capacities of major U.S. companies are:

	Annual capacity[1] (000 tons)	**Capacity share** (%)
1. International Paper	1,527	9.4
2. Weyerhaeuser	1,410	8.7
3. Union Camp	1,340	8.2
4. Stone Container[2]	1,295	8.0
5. Champion International	930	5.7
6. Container Corp. of America	892	5.5
7 Temple-Inland[3]	780	4.8
8. Owens-Illinois	720	4.4
9. Great Northern Nekoosa	680	4.2
10. Westvaco	620	3.8
11. St. Regis	603	3.7
12. Packaging Corp. of America	575	3.5
13. Willamette Industries	540	3.3
14. St. Joe Paper	458	2.8
15. MacMillan Bloedel	445	2.7

[1] Machines that can swing between producing linerboard and unbleached kraft paper make exact capacity estimates difficult.
[2] Includes assets recently acquired from Continental Forest Industries.
[3] Includes 50% share in Georgia Kraft Corp. jointly owned with Mead Corp.; all tonnage from the Phenix City, Ala., coated kraft board mill has been assigned to Mead.

Total U.S. capacity (1983): 16.266 million tons
Capacity share of top five companies: 40.0%
Capacity share of top ten companies: 62.7%

PRICING: Strengthening demand enabled the industry to implement two $20/ton price increases in 1983 to $270 in April and to $290 in September. The $290 price represented about breakeven for the industry, and producers were quick to take advantage of strengthening demand by announcing another $25 to $30/ton price increase for Jan. 1. (Year-end eastern U.S. transaction prices for 42-lb liner have been as follows: 1982, $250; 1981, $270; 1980, $270/$300; 1979, $270; 1978, $220; 1977, $195; 1976, $210; 1975, $202; 1974, 195; 1973, $145.)

Last spring the EEC imposed a minimum price of $333/metric ton ($302/short ton) on imports of U.S. heavyweight liner, and another increase to $365/metric ton has been announced for Jan. 1. Scandinavian producers have benefited from currency devaluations and upped market share.

(News section continues on page 25)

CAPITAL SPENDING

Cash woes slow capacity gains—API

Problems with cash flow experienced during the recession of 1981-83 curtailed capital expenditures and slowed down the capacity growth rate of previous years, said American Paper Institute senior vice president Norma Pace as the association's 1982-85 capacity survey was released.

Due to high interest rates, companies will have to generate more capital internally, she noted. API expects capital improvements in the industry will average about $6 billion a year during the 1984-86 period, compared to $3.5 billion ten years ago.

Total paper and paperboard capacity will rise during that time by 1.5% annually, reaching 74.1 million tons by 1986. This compares with advances of 2.3%/year experienced during the preceding 16 years. Pulp capacity will advance at the same 1.5% annual pace during the same period, rising to 58.7 million tons in 1986 from 56.2 million tons in 1983.

Capacity figures in the survey represent a compilation of more than 250 companies, representing 95% of all woodpulp and 90% of all paper and paperboard in the U.S. industry, according to API.

New machines will provide most of the new paper and paperboard capacity between 1984 and 1986. They will account for 52%, or 1.7 million tons, while improvements on existing machines, after removing the capacity of machines taken offline, will provide the remaining 1.6 million tons, the survey indicates.

Capacity increases in paper are expected to exceed the gains in paperboard, with the highest growth rate occurring in the printing and writing grades at 2.8%, followed by tissue at 2.3%. In the paperboard grades, unbleached kraft board will have the fastest growth in the packaging grades at 1.4% a year.

Pace attributed the healthy growth rate in printing and writing papers to the increased volume of communication papers, more business activity, and more use of computers and copiers.

"The evidence is getting stronger that the expanded use of information technology—at least at this stage—is demanding more paper," she noted.

Regional consumption. Industry's concentration continues to be highest in the South, and this trend is expected to continue, according to the survey results. Currently making up 53.0% of all paper and board capacity, the South's share is expected to grow to include 62.3% of all new capacity over the next four years. Of that share, southern woodpulp will account for 84.9% of the U.S. total, compared with 70.4% at present.

Both the Northeast and West will retreat from their current shares of total capacity for paper, paperboard and woodpulp. The Midwest will show a modest increase overall.

Raw material consumption. API expected a strong increase in raw material consumption in 1983 as the economy advanced, but there was a significant decline in 1982. Total fiber consumption declined in 1982 from the previous year by 5.9%, or 3.9 million tons, with woodpulp alone comprising 3.2 million tons of that drop. Recyclable paper was down 3.9%, or 597,000 tons, and other vegetable fibers fell by 143,000 tons.

Newsprint. The spurt in newsprint capacity growth by 40% in the past five years is expected to moderate now, said Pace. Capacity increases after 1983—when 225,000 tons were brought online—will amount to 231,000 tons.

Canadian newsprint mills, which presently supply an estimated 57% of U.S. needs, will raise capacity by 441,000 tons through 1986, according to the Canadian Pulp & Paper Assn.

Printing and writing paper. Net additions of printing and writing paper capacity will average 2.8% a year and total 1.5 million tons through 1986, surpassing the 1.9% annual growth rate forecast

(Continued on p. 35)

Growth trends in capacity

	16 year increase	Average annual growth	3 year increase	Average annual growth
Total paper & paperboard	**21,864**	**2.1%**	**3,274**	**1.5%**
Total paper	12,043	2.6	2,020	1.9
Newsprint	2,791	4.2	231	1.3
Printing/writing	7,039	3.1	1,554	2.8
Packaging & ind. conv.	518	0.6	(127)	(0.7)
Tissue	1,695	2.5	363	2.3
Total paperboard	9,821	2.1	1,250	1.2
Unbleached kraft	7,093	3.3	745	1.4
Solid bleached	832	1.4	155	1.2
Semichemical	1,648	2.4	97	0.6
Recycled	347	0.2	254	0.9
Total wood pulp	**17,197**	**2.2**	**2,484**	**1.4**
Dissolving & special alpha	33	0.1	—	—
Sulfite	(949)	(2.7)	(15)	(0.3)
Sulfate & soda*	15,377	2.9	2,139	1.7
Semichemical	860	1.3	72	0.5
Mechanical	1,876	2.4	299	1.7

*Includes screenings. ( )—loss.
Source: API

Regional distribution share of U.S. capacity changes 1983-1986

	Northeast	Central	South	West
Total paper & paperboard	**11.8%**	**17.5%**	**62.3%**	**8.4%**
Newsprint	—	—	79.6	20.4
Printing/writing	17.3	17.0	58.7	7.0
Tissue	20.3	48.0	24.5	7.2
Unbl. kraft (paperboard)	—	—	94.6	5.4
[illegible]	—	204.4	(154.2)	47.8
Total wood pulp	**1.3**	**10.3**	**84.9**	**3.5**
Sulfate & soda	1.2	5.5	89.2	4.1
Semichemical	14.8	75.7	(185.1)	(5.4)
Mechanical	(0.2)	28.4	75.1	(3.3)

[illegible]
Source: API

for all grades of paper. Uncoated free sheet will account for 1.1 million tons of the new capacity, while coated papers—both groundwood and free sheet—will provide 457,000 additional tons. Almost no growth is forecast for the other printing and writing paper grades.

Kraft packaging paper. With the exception of some shutdown capacity, almost all of the 247,000-ton reduction forecast for unbleached kraft packaging paper—to 3.8 million tons in 1986 from 4.1 million tons in 1982—is attributed to planned shifts of machine production to kraft linerboard.

Tissue. The startup of three new machines during the 1984-86 period and modernization projects already completed will increase tissue capacity by 363,000 tons, or 2.3% annually, to 5.5 million tons by 1986, according to API.

Unbleached kraft linerboard. Unbleached kraft linerboard capacity will rise by 737,000 tons to 17 million tons by 1986, or 46% of total board capacity, the survey reports. This includes swings of machine production from kraft paper to liner, rebuilds, improvements to existing units, and one new kraft liner mill.

Recycled paperboard. API expects capacity for recycled paperboard to increase 254,000 tons during the forecast period, or just less than 1% a year, to 9.1 million tons.

Sulfate and soda pulp. The highest growth rate for the major woodpulps is forecast for bleached and semibleached sulfate pulps, which will rise by 1.9 million tons, or 2.9% annually, between 1984 and 1986. Both grades are used mostly in printing and writing papers and food packaging paper and board. Conversely, capacity for unbleached sulfate pulp—used to make containerboard and kraft packaging papers—will grow just 0.3%, or 240,000 tons annually.

Market pulp. All of the additional capacity for market pulp during the 1984-86 period will be in bleached sulfate pulp, the survey reports. API sees capacity rising by 741,000 tons, or 4.6% a year, between 1984 and 1986.

'83 outlays jump 15%, survey shows

The pulp and paper industry will be one of only a few U.S. businesses to have increased capital spending in 1983, according to McGraw-Hill Economics' recently released annual fall survey of U.S. capital spending plans. McGraw-Hill estimates the industry spent $6.86 billion in 1983, up 14.9% from the 1982 level of $5.97 billion. U.S. business as a whole spent 3.7% less in 1983 than in 1982, said the report.

U.S. pulp and paper companies plan to boost capital outlays to $7.44 billion in 1984, the survey shows, up 8.4% from the estimated 1983 level, while U.S. business in general plans a 9.4% increase. Though an 8.4% boost is not as dramatic as increases planned by some other industries—automakers head the list at 49.2%, for example—pulp and paper companies don't have to play catch-up, McGraw-Hill points out, since they were among the few who increased capital spending in 1983. Adjusted for an anticipated 5.2% hike this year in the price of capital goods, the paper industry's real spending will rise 3.2% vs 3.6% for business overall.

Pulp and paper industry spending plans for 1985 are even more ambitious: preliminary reports show companies planning a whopping 22.1% increase in capital expenditures to $9.80 billion, the third largest increase planned among U.S. industries. Business overall projects 1985 capital spending growth of 7.4%.

The paper industry for the most part mirrors business's rosy view of the economy in 1984, with 69% of those surveyed anticipating rapid growth, 19% normal growth, and only 12% seeing slow growth ahead. Paper companies anticipate raising prices 4.7% next year and expect sales to go up 10.8%—somewhat less than the 12% gain in sales seen by business overall.

The paper industry continues to devote a disproportionate amount of capital to energy conservation, with expected outlays of 5.0% in 1983 and 4.3% in 1984 about double business's average of 2.4%. In the area of automation, pulp and paper firms expect to raise spending by 10.9% in 1983 and 11.4% in 1984, lagging business as a whole, which plans to spend 14.7% of total outlays on automation in 1983 and 16.6% in 1984.

INTERNATIONAL TRADE

U.S. pushing Japan for concessions

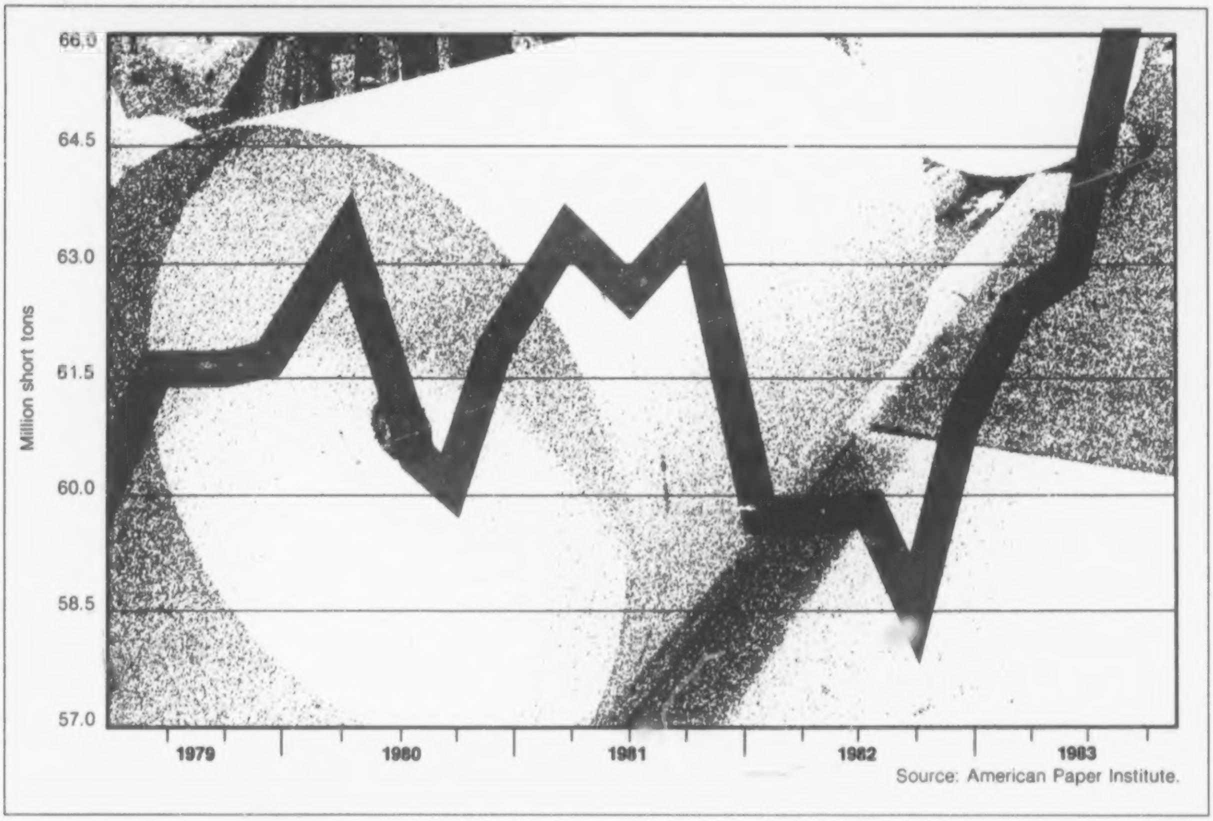
Restrictions on pulp and paper imports into Japan have been a bone of contention for U.S. industry, which seeks freer entry for its products into the Japanese market. Commerce Secretary Malcolm Baldrige discussed paper industry restrictions on his recent visit to Japan. And now, at the invitation of the Japan Paper Assn., 13 CEOs of U.S. paper companies will go to Japan early this year to meet and talk with their counterparts from Japanese paper firms.

Although Japanese officials contend there are no barriers blocking imports, they have taken some steps toward lowering tariffs on some paper imports.

A first step was made early in 1983 when tariff reductions on several paper items imported from the U.S. that were scheduled to become effective in 1987 were advanced to Apr. 1, 1983 (*P&P*, Feb., p. 13). Scheduled reductions for additional grades have now been advanced from 1987 to April 1984. These include sack kraft paper (excluded in the earlier round), which will now join kraft linerboard next April at the 9.3% tariff level. Twelve coated printing and coated specialty paper grades will also be granted a lower tariff in 1984—but since the total import of these grades into Japan last year was only 58 tons, this is not a very meaningful reduction.

The U.S. government has been pushing for lower tariffs on paper imported into Japan because the U.S. paper industry is one of the few U.S. industries that is in a position to export competitively worldwide, observes Dr. Irene Meister, vice president/international of the American Paper Institute. As an industry supporting liberal trade, it is the U.S. paper industry's position that Japan, the world's second-largest paper/board producer, should have a more open market. Meister points out that the U.S.'s market share of Japan's total paper consumption in 1982 was 1.7% and its share of paperboard 2.1%. For kraft linerboard, the U.S. supplies less than 5% of Japan's total linerboard consumption—dramatically less than the U.S. market share in Europe.

U.S. paper and paperboard production, 1979-83 *(seasonally adjusted annual rate by quarter)*



Source: American Paper Institute.

OUTLOOK 84

Strong U.S. pulp and paper industry recovery seen continuing in 1984

Rising output and a wider price-to-cost margin should produce banner profits—but some worry about high interest rates and the strong dollar

SPECIAL P&P REPORT

■ The strong recovery that began last year in the U.S. paper industry should continue into 1984, with rising prices combined with moderate cost increases, resulting in a banner year for profits, according to most industry observers.

But high interest rates related to the huge federal budget deficits—expected to run in the $150- to $200-billion range over the next several years—remain a source of concern. "The most critical problem for the paper industry is the ongoing conflict between fiscal and monetary policy as it affects interest rates, dollar exchange rates and inflation," notes Dr. Edwin Gee, chairman and CEO of International Paper Co.

Any significant runup in interest rates this year would add further strength to the dollar and further undermine competitiveness of U.S. pulp and paper producers in overseas markets. Higher rates would also stifle any further recovery on the forest products side of the industry and set the stage for another recession that could drag down the paper industry as early as next year. Nevertheless, most industry executives surveyed

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Outlook '83 was prepared by Carl Espe and Will Mies in San Francisco and Debra Adams and Dave Allan in New York.

What analysts are projecting for 1984

Percentage change from 1983 levels[1]

	Growth in real GNP	Paper/board production	Operating rates[1]		Prices paper/board	Costs per unit output	Operating profits[2]	
			Paper	Paperboard			Paper	Forest prod.
George Adler Smith Barney	+4.9%	+4.0%	94.8%	92.6%	+12.0%	+4.0 to +5.0%	+40.0%	+125.0%
Chad E. Brown Kidder Peabody	+5.1	+5.0	+94.5	93.2	+12.0	+4.0	+85.0	+25.0
Clarence W. Brown Lehman Brothers	+4.0	+4.0	93.0	93.0	+8.0	+5.0	+75.0	+50.0
Thomas P. Clephane Morgan Stanley	+5.1	+4.9	94.8	92.8	+10.5	+5.6	+95.0	+90.0
Evadne S. Lynn Merrill Lynch	+5.3	+4.6	91.8	90.0	+11.0	+4.3	+47.1	+68.5
Lawrence Ross Paine Webber	+5.1	+5.0 to +6.0	92.5	94.0	+7.0 to +8.0	+1.0 to +2.0	+50 to +60	+70 to +80
Mark S. Rogers Dean Witter	+5.0	+5.3	94.0	93.5	+15.7	+6.2[3]	+91.0	+129.0
H.C. Bowen Smith Salomon Brothers	+5.0 to +5.5	+4.0	93.0	93.0	+7.0 to +8.0	+4.0	+70 to +75	0 to +10
Rodney Young/John Maine Data Resources	+5.6	+5.6	93.0	95.0	+14.1	+4.3	n.a.	n.a.
William M. Wigder First Manhattan	+5.2	+6.6	97.0	94.0	+9.0 to +10.0	+6.0	+70.0	+35 to +40
Average	**+5.1**	**+5.0**	**93.8**	**93.1**	**+10.8**	**+4.5**	**+70.1**	**+67.2**

1. Operating rates show production as a percent of capacity.
2. After-tax profit excluding extraordinary or nonrecurring items. Earnings for paper companies generally include some contribution from wood products, while forest products profits derive partly from paper operations. Merrill Lynch and Salomon Brothers estimates are based on pretax profits.
3. Input costs.

by *Pulp & Paper* believe that "crowding out"—a serious collision between federal and private credit demands that would drive up rates—can be avoided this year, allowing time for a post-election budget compromise to be worked out in 1985.

FROM THE DEPTHS. U.S. paper industry production last year bounced back from the depths of the recession with remarkable strength. Production for 1983 is expected to hit a record 64.6 million tons, with paper at 32.8 million tons and paperboard at 31.8 million tons. "This would put paper 6% above the previous high established in 1981 and 8% above the 1982 recession level," American Paper Institute estimated. "Paperboard would be 2% above its 1981 high and 9% above 1982."

Printing/writing paper showed the earliest strength, with uncoated free-sheet shipments for the year expected to be up 10% and coated paper shipments 12% higher than in 1982. The strong turnaround reflected the proliferation of small computers and other electronic office equipment, rising advertising expenditures and catalog sales, and some customer inventory building, according to analysts. Even coated groundwood—predicted to be in oversupply into 1984-85 because of a glut of new capacity—was tight by year-end, with customers on allocation and producers already thinking about new machines.

Containerboard production also made a strong comeback, helped by record corrugated box shipments and a surprising 12% increase in linerboard exports. Liner output for the year jumped more than 10%, while semichemical medium increased about 7% and was in tight supply by year-end. Tissue production in 1983 rose about 8%, while bleached board increased 6% and recycled paperboard was up roughly 10%. Only newsprint and groundwood paper, up about 2% to 3%, failed to show strong volume gains.

"Sharply higher demand for virtually all grades of paper and paperboard has gradually led to stronger selling prices for many but not all of these products," according to Clarence W. Brown of Lehman Brothers Kuhn Loeb. By late 1983, prices for many white paper grades had returned to their prerecession 1981-82 peaks and containerboard had advanced close to its former list level after two rounds of price increases. But market pulp, newsprint, and sanitary tissue paper were notable exceptions to the improving price trend, Brown adds.

Because overcapacity was so great, the dramatic gains in production did not begin to pull operating rates of key grades up to the "magic 92% to 93% threshold," at which producers have historically been able to push through price increases, until the second or third quarter of last year, notes analyst Thomas P. Clephane, of Morgan Stanley & Co. For the year, the overall industry operating rate averaged only about 92% for paper and 89% for paperboard while overall industry prices were flat to slightly lower, according to the consensus of analysts surveyed by *P&P*.

(Continued)

The importance of price movement for the industry can be seen from the fact that despite an 8% production gain and relatively no rise in unit costs, paper industry operating profits in 1983 rose only about 5% to 10%, according to most analysts' estimates. And of course some of this probably came from a sharp resurgence in forest products earnings.

CROWDING OUT? The full-throttle momentum of the economy going into 1984 against a background of looming budget deficits appeared to give further credence to "Dr. Doom scenarios" of rising interest rates. "The plain and simple truth is that deficits of this size do crowd out the private sector in competition for financial resources," Potlatch chairman and CEO Richard B. Madden told analysts recently. "The potential impact of the present deficit on the forest products industry is already apparent."

Nevertheless, API senior vice president Norma Pace is optimistic that any rise in interest rates this year will be moderate. "We're expecting that interest rates will hold near current levels through spring of 1984 after which there may be a modest increase—but we do not expect interest rates to reach a level that will stop the economic recovery," she says. "We are optimistic inflation rates will not heat up too much this year, which would mean that lenders might ask for a smaller premium . . . and the Federal Reserve would be under less pressure to pull in the monetary reins."

And analyst Lawrence Ross of Paine Webber believes that private credit demands will be modest this year due to the "dramatic improvement in the amount and quality" of corporate cashflow. "For years corporate depreciation allowances have been too low because of rising inflation. Now with the decline in inflation, cashflow profits are looking better than reported profits." One reason has been changes in the tax law which permit more liberal depreciation allowances.

FURTHER GROWTH. Pace is projecting 4.7% growth in real GNP in 1984, following a 3.7% rise last year. "Paper production will continue to outpace real GNP and could be 6% in 1984 because of strong growth in communication and magazine paper." Industrial production should rise over 8% in 1984 and this would result in a 7.5% to 8% increase in linerboard production. Overall, she expects operating rates to average 94% for paper and 95% for paperboard in 1984.

Dr. Gee expects GNP to rise by 5% in 1984, while inflation increases only modestly from 3.5% in 1983 to around 5% in 1984. "Some of the underlying economic and political trends that make IP optimistic about the future are continued inventory building and an upswing in capital spending, along with modest gains in consumer spending and home building.

"Because the industry has historically tracked the overall economy closely, IP is forecasting an increase in paper and paperboard production of about 6% to 7% in 1983 and 4% to 5% in 1984. Operating rates should average above 90% in 1984, and assuming the recovery continues, remain there in 1985-86."

And Steven C. Mason, president and chief operating officer of Mead Corp. comments: "Moderating interest rates and the national election should provide the stimulus for continuing U.S. economic recovery in 1984 and this will benefit both paper and paperboard."

He expects paper production will grow 4% in 1984, less than its rise in 1983, "but still healthy." Some of the strong turnaround in paper demand in 1983 may have been due to inventory building, he notes. "As pipelines fill, there will be some reduction in demand for paper and a slowdown in the rate of paper price increases." Containerboard production should grow 4.2% this year, with a 4 percent improvement in capacity utilization, he says.

"Market demand for printing and writing paper looks like it will remain strong through 1984," said W. A. Franke, president and CEO of Southwest Forest Industries Inc. "The market outlook for linerboard also looks positive. Linerboard operating rates approaching 95% are anticipated by the end of 1984's second quarter. Overcapacity, particularly in the West, and persistent problems with a strong U.S. dollar against foreign currencies should depress newsprint operating rates, but there will be an increase in demand over 1983."

UNCERTAIN EXPORT MARKETS. Franke is fairly pessimistic about export markets this year. "Though the dollar is expected to decline somewhat in 1984 against major western European currencies and the Japanese yen, a drop large enough to substantially improve the U.S. competitive position during 1984 seems unlikely," he says. "In addition, strong domestic demand should offer producers better profit margins than those available in foreign markets. Long-term prospects for improved foreign economies and demand for pulp and paper products look encouraging, but significant increases in export activity are unlikely until 1985."

But Dr. Gee is somewhat more optimistic: "How much the dollar declines in 1984 will play a leading role in the rebound of U.S. exports. With the U.S. rapidly regaining its low-cost producer status, IP projects a modest growth in U.S. paper and board exports in 1984 of between 5% and 10%."

And analyst H. C. Bowen Smith of Salomon Brothers notes that since Scandinavian producers are operating at capacity, incremental demand from Europe will have to be satisfied either by the U.S. producers or from inventories. "That situation should allow for stronger export prices in 1984."

MAGIC THRESHOLD. Analysts surveyed by *P&P* expect operating rates for paper to average 93.8% in 1984 and for paperboard, 93.1%. "But in a number of the really important grades—linerboard, uncoated free sheet, coated papers, and bleached board—operating rates should be near 95% or above," Clephane says. Mark Rogers of Dean Witter Reynolds predicts operating rates of 98% for linerboard, 95% for coated paper and uncoated free sheet, and 94% for bleached board.

According to the latest API survey, paper and paperboard capacity will rise only 1.6% in 1984 and average 1.5%/year for the entire 1984-86 period. But Smith Barney analyst George Adler says that this year the industry may "find capacity" due to the shift of kraft paper machines to liner production, white paper machines dropping less profitable grades, and recently installed machines running above design capacity.

Analysts on average are looking for about a 10% to 11% rise in paper and paperboard prices in 1984. "We expect the largest pricing gains in linerboard, market pulp and uncoated printing paper, all of which experienced significant price declines during the recession," Rogers notes. Clephane projects linerboard prices will rise about 21% next year and uncoated free sheet around 12.5%.

HOLDING DOWN COSTS. U.S. paper industry costs per unit of output were relatively flat in 1983 and will probably rise only 4% to 5% this year, according to most analysts. Unit labor costs actually declined last year due to a dramatic 10% rise in productivity (output per work-hour) which more than offset a 7% increase in wage rates.

"Fiber costs are currently showing mixed trends," according to Merrill Lynch analyst Evadna Lynn. Southern pulpwood and chip prices are rising moderately, while chip costs on the West Coast have dropped sharply due to higher lumber production and weak export demand. Energy costs have been relatively stable, while chemical costs have probably declined, she says.

In 1984 Lynn looks for the following increases in unit costs: labor, 2%; fiber, 3%; energy, 5%; chemicals, 11%; and freight, 5%. "Certain companies will also benefit from the substantial reduction in overhead costs which were prompted by the severe financial pressures during 1982 and the first part of 1983," Smith notes.

Peter J. McLaughlin, chairman and CEO of Union Camp Corp., recently told analysts that his company—one of the most efficient in the industry—looks for an overall rise of 4% to 5% in input costs this year. "Output costs will certainly be lower than that because we are anticipating greater volume and more efficiency on the cost side due to further improvement in productivity."

BANNER PROFITS. Analysts on average expect the mixture of higher volume and prices plus moderation in costs to result in around a 70% increase in operating profits for U.S. paper companies this year—for what would be the sharpest increase in postwar years.

Forest products companies will show about a 67% increase in operating profits in 1984, despite a decline in housing starts from around 1.7 million units in 1983 to 1.67 million in 1984, according to the consensus estimate. The higher profits would reflect improved demand from remodeling, multifamily and export markets and higher income from pulp and paper operations.

The most bearish is Smith of Salomon Brothers who looks for housing starts of 1.5 to 1.6 million in 1984. "We believe that mortgage rates will stay in the 12.5% to 13.5% range, making it difficult for many people to buy single-family homes." He looks for no increase in lumber and plywood prices this year and a decline in manufacturing profits.

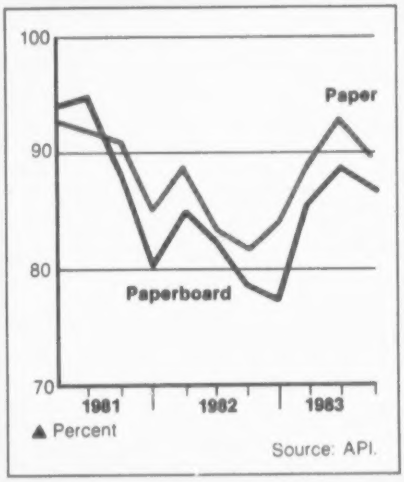
HIGHER CAPITAL SPENDING? Industry executives and analysts were mixed on whether increased profits will translate into higher capital spending in 1984. "Because of the recession, we project a 10% decline in industry capital spending in 1984," remarks Dr. Gee. "IP, as well as other companies, will continue to invest in those projects that lower manufacturing costs. Until prices in many segments of the industry surpass pre recession levels, there is insufficient return on investment for new capacity expansion."

A similar note of caution was struck by Franke, who said that said that Southwest Forest would continue to institute "tight operating controls and close fiscal management" in 1984. "Capital expenditures will be oriented toward ongoing improvements to existing plants and facilities to maximize efficiency and production."

"Capital spending should pick up for most of the industry in 1984," according to Mason of Mead. "Return on investment at current prices will not justify those expansions, but you have to bet on the future in this business and the bets are big!"

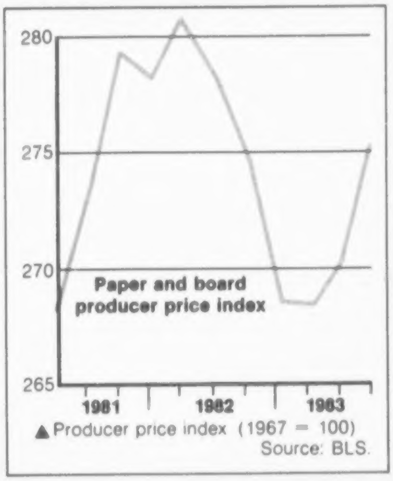
(Continued) ■

U.S. paper/board operating rates firmed in 1983 . . .



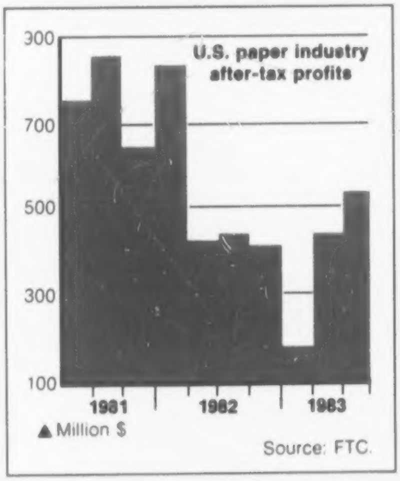
Source: API.

. . . enabling producers to push through price hikes . . .



Source: BLS.

. . . which helped restore hard-pressed profit margins



Source: FTC.

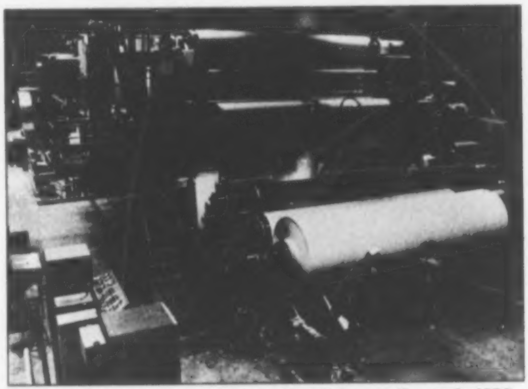
COATED PAPER

Roaring recovery is under way

Coated papers entered 1984 with virtually all machines operating full tilt and customers on allocation for most products. This situation will continue through much of the year and could last into 1985 and beyond, industry executives say.

Indeed, with no major coated paper capacity expansions currently announced—although several projects are possible candidates for startup in the next five years—the only thing that could hurt the market would be a significant economic downturn.

Both coated groundwood and coated free sheet benefited from the dramatic turnaround in demand during the second half of 1983. The two paper grades differ in significant ways, however, so they will be handled separately here.



The market for coated paper should boom through 1985.

COATED GROUNDWOOD. Looseness in supply had shown up in 1982, but it was not until early 1983 that the situation got bad enough that prices deteriorated significantly. In early June an attempted price increase fell apart for lack of support—but by mid-July customers reported trouble securing adequate supplies of paper. The turnaround was sudden indeed.

Following successful price hikes of about 7% in October 1983—bringing price levels back up to where they were at the start of the year—further increases of 7% to 8% were announced for January 1984. Allocations were in effect, and disappointed customers were going to uncoated groundwood or were shopping around for papers from West Germany, France, Finland or Italy.

Executives contacted by *P&P* expect allocations to remain in place through 1984 or beyond. St. Regis Corp. senior vice president James Bowersock believes allocations could last through 1987 "and possibly longer," while Blandin Paper Co. vice president Thomas McKeon expects them to continue until new capacity starts up or the economy slows down.

Both Bowersock and Michael P. Corey, Champion International Corp.'s director of planning and analysis, expect customers to go abroad for coated paper "if there is a modest shortfall in supply," in Corey's words. Bowersock predicted allocations will "very likely result in a significant increase in imports as it did in 1978 and 1979. The primary source of these imports would be Finland."

He also expects customers to shop around for uncoated supercalendered paper if they can't get all the coated groundwood they want. He notes that "since uncoated groundwood grades have prominent positions in magazine publishing (6%), other periodical (59%) and commercial printing (5%), these are all possible markets for potential penetration" by uncoated groundwood substituting for coated paper.

Bowersock also noted that "uncoated groundwood has lost its greatest share in the 'other periodical' market, and this would appear to be the area in which SC groundwood would have the better opportunities."

One other U.S. coated groundwood executive, who forecasts a 96% operating rate for his industry in 1984 compared with his estimate of 94.5% in 1983, picked commercial printing, catalogs and Sunday magazines as the likely areas for uncoated groundwood penetration into coated.

He and virtually all other observers think the industry will have to run at nearly full capacity this year just to satisfy demand. Blandin's McKeon sees operating rates at about 95%, which he described as "the full rate," while Bowersock sees rates rising from 93.7% in 1983 to 98.3% this year. Last year's 14% increase in shipments, from a poor base, will be followed by a healthy 7% rise this year, according to the St. Regis executive.

McKeon pointed out that a 13.3% increase in coated groundwood shipments through the first eight months of 1983 represented a rise in demand of more than 225,000 short tons from the same period in 1982, thus absorbing virtually all of the new capacity started up in the previous two years.

Another U.S. executive sees magazine shipments lagging industry averages in 1984 with only a 4% rise, but says catalogs and commercial printing demand should climb about 6% to produce an average increase of 6% for the coated groundwood industry.

With this kind of strength in demand and shipments, customers will be hoping for announcements of new capacity. Unfortunately not much new capacity is coming online in the next few years.

Champion forecasts capacity increases of just 15,000 tpy each from relatively new paper machines started up in recent years by Mead, St. Regis and Weyerhaeuser Co. as those units reach peak design capacity. Champion also sees 15,000 tpy of new capacity at Pentair in 1984 in addition to 6,000 tpy of new Pentair capacity in 1985, plus miscellaneous additions through modernization work throughout the industry totaling a further 55,000 tpy in 1985 and 22,000 tpy in 1986.

Some customers consuming top-end coated groundwood may contemplate shifting up to Scott Paper Co.'s new Hinckley, Maine., machine, which started up in late 1982 and is still getting up to speed, but Champion only sees 55,000 tpy of additions from that machine in 1984 and 20,000 tpy in 1985. But Bowersock points out that the 200,000-tpy Scott unit is dedicated to basis weights of 40 lb and up and thus won't compete with lightweight coated producers such as St. Regis.

Most observers do expect to see some new coated groundwood machines announced this year. One U.S. executive predicts new announcements will signal the addition of 180,000 tpy of capacity, while Bowersock notes "it is very likely that at least two machines will be announced for starting in 1987 or 1988." Blandin's McKeon predicts "at least two other machines" will be announced in the next six months, other than a new unit Blandin has been considering for some time.

COATED FREE SHEET. Allocations were also in place for coated free-sheet customers at the beginning of the year, and observers say that situation is likely to continue through much or all of 1984. As Champion's Corey notes, "the only downtime currently taking place is due to maintenance and/or repair needs. Basically, the coated free-sheet business [was] operating at full capacity in 1983 and will continue to do so in 1984."

St. Regis's Bowersock estimates coated free-sheet operating rates for 1983 at 93.7%, the same as coated groundwood, but he believes free-sheet mills will run at 94.8% in 1984—a slightly less superheated pace than the 98.3% of groundwood but still very respectable.

By the same token, free-sheet mills also did not see quite the slide in early 1983 that groundwood mills experienced. The 8% jump Bowersock saw in free-sheet shipments in 1983 was healthy but well short of groundwood's levels. Still, the more stable free-sheet industry will increase its shipments by almost as much as groundwood in 1984: up 6% compared with the 7% climb Bowersock sees for groundwood.

One U.S. coated paper mill executive sees a free-sheet shipments rise of just 4% this year, but even this would keep operating rates high in face of the 3.5% increase in annual coated free-sheet capacity forecasted by American Paper Institute for 1984.

And at Champion, Corey believes that "all coated paper shipments will outpace the GNP" in 1984, and that coated free-sheet consumers are not likely—in face of tight coated groundwood supplies and also high-quality demands made by advertisers—to attempt to downgrade to other kinds of paper.

The one new machine in coated free sheet in recent years is the 200,000-tpy unit that Scott started up in Maine in late 1982. But as Corey notes, "a fair amount" of the output of that machine is aimed at the book publishing industry. "Publishers' matte would be a large part of what the machine is now producing," although "most likely they will continue to try to develop other products on the machine." He believes the machine will eventually affect both the free-sheet and groundwood markets, but notes "both markets are getting stimulus from an increase in demand from a broad range of areas, so the effect might not be too significant."

Other than that machine, no significant blocks of capacity are likely to come online in the next two years, so operating rates should continue high. Indeed, Champion sees the Scott machine bringing in 120,000 tpy of capacity in 1983, 55,000 tpy in 1984 and 20,000 tpy the following year. The company forecasts other miscellaneous industry improvements over the four-year period of 1983-86 averaging just 28,000 tpy annually plus "other probable additions" starting in 1986 when this category would add a further 40,000 tpy to industry capacity. Thus new capacity will continue to lag new demand.

One area of coated free sheet that appears unlikely to rack up any large gains is the coated one-side business, where Bowersock thinks 1983 shipment gains will be followed by a rise of just 1% this year.

UNCOATED FREE SHEET

Little downtime likely in '84

Uncoated free-sheet mills won't have much reason for concern about operating rates this year as the industry appears to be heading into its best year by far this decade. Most major end uses have recovered strongly from the recession and appear headed for healthy growth for several years to come.

Some uncoated free-sheet products were on allocation or in tight supply going into 1984, although part of that was due to bounce-back from artificially depressed sales levels plus normal recovery-year inventory-building that will moderate in the coming months.

However, International Paper Co.'s Michael Pollert noted in a recent interview in a printing industry publication that "the printer's challenge for the short-term will be to manage his paper inventories so as not to lose out on business" since "we have orders to fill our manufacturing system right now, and lead times are getting longer."

That situation should correct itself somewhat this year. Champion International Corp.'s Michael Corey predicts that "once a more reasonable balance between demand and supply has been struck, the uncoated free-sheet market will grow at a more traditional pace—that is, slightly ahead of the GNP." Union Camp Corp.'s Robert Sasser says that "we feel inventory levels have about peaked."

Corey believes that bond and copier papers will outperform the GNP and offset will keep pace with overall economic activity, but envelope and tablet papers will lag economic growth rates.

The spread between uncoated free sheet's high-flyers and its slow-lane performers was wide last year, and that divergence will moderate some in 1984. Union Camp's Sasser projects cut-size bond and xerographic paper shipments will grow at 6% to 7% in 1984, compared with a 17% to 18% explosion in 1983. Offset printing paper's 6% rise last year will moderate to 3% this year; forms bond's 9% to 10% jump in 1983 should now slow down to a still-respectable 6% to 7% climb.

What this will mean for all uncoated free sheet, in Sasser's view, is an average growth rate that is down from 8% last year to about 3% or 4%. Even the slowest of the major slow-lane performers, the book publishing industry, should see its uncoated free-sheet shipments rise 1% to 2% this year, Sasser predicts.

Although Sasser says "the book market is recently showing signs of recovery," Corey disagrees. "There is no reason to expect the book market to recover during the next year," he says. Book manufacturers are tied to the performance of both domestic and foreign markets and are also likely to be slowed down by declines in school enrollments, according to the Champion International executive.

"Granted, there are other aspects to the book market—such as fiction and non-fiction. But the elementary /high school/university segment is such a significant part of total sales that we'd have to look at that as our indicator," he concludes.

One factor affecting the printing grades of uncoated free sheet was pointed out in the recent interview with International Paper's Pollert. He noted that "copy paper and computer forms paper is made on the same . . . machines that offset and other printing grades are made on. So commercial printers are, in effect, competing with machine time with two faster-growing segments."

He expects commercial printing growth rates to roughly match the GNP in the next few years, while uncoated free sheet as a whole—and particular copy papers, forms and web offset—are leading the parade.

Pollert thinks this kind of growth will lead to overall uncoated free-sheet operating rates of 94% to 95% this year. Union Camp's Sasser is a bit more bearish, predicting no change on average from the 92% to 93% of 1983. On the other hand, he sees no lasting harm from the 1.1 million tons of new capacity American Paper Institute sees coming online between 1983 and 1986 (an 11.9% rise over those four years). In Sasser's opinion, "the rise in demand over the next two years should just about cover capacity increases."

Corey feels that "a modest imbalance between demand and capacity is bound to occur until the overall average of usage catches up with instantaneous addition of capacity." But Corey also sees some signs on the horizon that end-use markets will take care of that new capacity over the long run. He agrees with Sasser that personal and small office copiers will have a positive impact on paper demand, especially over the next five years.

Indeed, Sasser thinks that without "continued placement of smaller, cheaper, more convenient copiers, copy volumes could mature to 5% to 6% growth per year." With such a trend toward cheaper and smaller copiers, however, annual copy volume growth rates of 8% to 10% are reasonable over the next five years.

Not all of the product trends are favorable to the uncoated free-sheet industry, however. Corey notes that "more groundwood forms paper will begin to be sold." He explains that in recent years "groundwood gained share because it provided an economical alternative for some applications over a period of time. It then lost share when the difference in price between groundwood and free sheet narrowed to the point where users had no incentive to continue to accept a loss in production and desirability aspects of the end product."

In Corey's view, "the relationship between these two products is based primarily on price." Sasser agrees that "groundwood forms growth depends on the price differential between uncoated free and groundwood." Neither one will comment on the likely price differential between the two products, but clearly as prerecession differentials are restored—which many other market observers claim is happening—it is bound to restore some of the attractiveness of groundwood forms.

CONTAINERBOARD

Strong rebound seen

Tighter markets for linerboard and corrugating medium are forecast by most industry observers for 1984, with continued growth in demand and only limited capacity expansion. This should enable producers to push through substantial price increases to restore badly needed profitability.

BOX BOUNCEBACK. Shipments of corrugated boxes came back strongly with the economy in 1983, rising about 7.5% from their depressed 1982 level and exceeding their previous all-time high of 250.6 billion ft² set in 1979. The resurgence should continue in 1984 with most economic forecasters predicting about 9% growth in industrial production, which box shipments closely track.

Roger W. Stone, chairman and CEO of Stone Container Corp., predicts corrugated box shipments will rise 6% to 7% this year, followed by growth of 5.5% in 1985 and "maybe" 3.5% to 4.0% in 1986. J. Carter Fox, president, Chesapeake Corp. of Virginia, says the domestic corrugated box business should "reflect the general improvement expected in the overall economy," adding that "the structural shift within the economy toward the service sector should give the corrugated box business additional momentum."

Liner output sprang back more than 10% over its depressed 1982 level last year, helped by a surprising 12% rise in export shipments despite the strong U.S. dollar and lagging recovery in most other parts of the world. "We expect growth in demand for U.S. kraft linerboard to be in the 4% to 6% range which, combined with continuing improvement in the export markets, will raise operating rates in 1984 over 1983," forecasts Fox.

Stone expects liner operating rates to rise from about 91% in 1983 and their depressed 84% level in 1982 to 98% in 1984 and more than 100% in 1985. "I'm not sure what the 1985 number means, except that customers will really be scratching for brown fiber," Stone says. A Weyerhaeuser Co. executive notes: "Overall, we expect 1984-86 to be strong years for containerboard, with higher operating rates than we have seen historically."

PRICE RELIEF. Improving operating rates and the desperate need to restore profitability resulted in two $20/ton eastern U.S. price increases on 42-lb liner last year to $270 in April and $290 in September—but even at that level the typical U.S. mill was probably only at about the breakeven level (especially with some discounting below list prices). Therefore, producers are trying to push through another increase to $320 on liner ($310 on semichemical medium) in early 1984.

"Without specifically commenting on prices, it seems clear that with very good operating rates expected in 1984 and a poor financial performance by our industry for the past two years, there should be strong pressure to regain satisfactory margins," Fox notes. Analyst Thomas P. Clephane of Morgan Stanley & Co. expects list prices to average $326 for all of 1984, up from $270 in 1983, and then average around $388 in 1985. This would result in dramatic increases of 21% in 1984 and 19% in 1985.

CAPACITY SHIFTS? Improving profitability will no doubt encourage a new round of containerboard capacity expansion. But as Goldman Sachs analyst Bruce Kirk notes, "New mill or machine lead time is two or three years, and it is doubtful that any sizable new unit could be brought online before late 1985." Latest API capacity survey shows unbleached kraft board capacity rising by only 1.4%/year over the 1984-86 period. This includes a new 280,000-tpy mill for which financing was still uncertain in late 1983 but excludes a new machine announced by Chesapeake Corp. which will add 83,000 tpy (net) in 1986.

One source of uncertainty, however, is how much kraft paper capacity may be converted to linerboard production if plastics make strong inroads into the grocery sack market. "About 5% of paper grocery sacks have been displaced by plastic sacks, primarily in metropolitan markets," Kirk says. "Various studies indicate that as much as 25% of the 2.1-million-ton grocery sack market may eventually be dislodged, and dedication of 500,000 to 600,000 tons of grocery sack paper to linerboard would increase capacity." But Kirk notes that some kraft paper machines may be shut down because their conversion to liner may be uneconomical, while others may be shifted to bleached grades (International Paper at Mobile, Ala., and Haindl Papier at Port Townsend, Wash.).

Another area of uncertainty is export markets where U.S. producers may continue to be handicapped by the strong dollar. Nevertheless, Fox comments that "underlying demand for U.S. linerboard in overseas markets will show improvement in 1984."

Forecast of U.S. paper/paperboard operating rates

	1982	1983e	1984e
Newsprint	89.2%	89.8%	91.9%
Uncoated groundwood	83.8	84.5	89.8
Coated paper	90.1	91.4	94.8
Uncoated free sheet	87.8	94.9	94.9
Packaging & industrial	87.7	91.9	94.7
Tissue	85.8	89.[illegible]	92.0
Total paper	**87.7**	**91.4**	**92.9**
Unbleached kraft	83.9	90.9	95.4
Semichemical	83.2	89.1	90.2
Bleached board	87.6	91.8	95.3
Recycled board	74.2	79.5	83.1
Total paperboard	**81.8**	**87.9**	**91.5**

Source: Average of Merrill Lynch and Dean Witter Reynolds estimates (based on capacity data from 1982 API survey).

BOXBOARD

Prices on firming trend

Folding carton plants were still not running as well as expected late in 1983, causing continued weakness for recycled boxboard and solid bleached sulfate mills, observers said.

Price increases slated for clay-coated recycled board and bleached board in the fourth quarter of 1983 were firming late in the year, but some observers felt it could take until the second quarter of this year for the new levels to take effect for all customers.

SBS prices were scheduled to go up $35/ton to the 1981 list price of $625 by Oct. 1, but some producers reportedly rolled back to Nov. 1, and at least one manufacturer was planning to implement the increase on Dec. 1.

Clay-coated recycled board producers were attempting late in the year to return to the 1981 list of $425/ton (20-pt, 80-brightness, in rolls), with increases averaging $20 to $25, but the move was meeting strong resistance due to high inventories and relatively poor demand for folding cartons.

WASTEPAPER COSTS SOAR. Despite slow orders for the normally busy Christmas season, recycled board producers struggled to raise prices to offset sharp increases in wastepaper costs during the second quarter. As early as August, clay-coated mills sought a price hike, but many customers were still not at the new level by late in the year.

However, an early summer $20/ton price increase to $280/$300 for 20-pt bending chipboard in rolls took hold with relatively little resistance. Market observers attributed the strong market to a limited supply caused by machines permanently shut down over the past few years and the diversion of some tonnage to construction grades.

Operating rates for chipboard mills are expected to be in the mid-90s, according to market executives. Clay-coated producers will probably only run in the low 90s though, they indicate.

SBS mills are likely to operate in the high 90s, with continued growth in such end uses as aseptic packaging, ovenable paperboard, display board for advertising, and high-quality folding cartons used to package such products as cosmetics and drugs.

One observer feels SBS markets in heavy cup will rise 5% this year; plate, dish, and tray, up 2% to 3%; bleached bristols, up 3%; miscellaneous uses, up 4% to 5%; domestic milk carton, flat to down 2%; and folding carton, up 4% to 5%.

CHANGING MARKET SHARES. Some feel, however, that clay-coated board will continue to erode bleached board's folding carton market as recyclers continue to improve product quality. Others reply that clay-coated quality has reached its apex and demand will increase only in proportion to a rise in the overall economy.

Bleached board mill operating rates should remain high for at least the next few years due to limited capacity additions. Only 132,000 tpy of solid bleached paperboard capacity is expected to be added between 1982 and 1986, according to API's latest capacity survey. However, this does not include a new machine that one company may soon announce for a southern mill. Recycled board capacity, however, is expected to rise 409,000 tons over the same period, although most of the increase is in recycled containerboard and not boxboard.

Despite some weakness in the folding carton market late in 1983, though, this year is expected to see both recycled and bleached board markets recover to near-normal health.

Prices for both grades should rise again this year, with about a 5% increase in bleached board and an average 6% boost in the recycled grades, with chipboard probably moving higher than clay-coated. Depending on how fast the economy recovers, the price increases could take effect as early as the second quarter, a time when converters are ordering for the spring pickup in the market, observers say. ■

CANADIAN INDUSTRY

Light at end of tunnel may be real for Canadian mills in '84 after all

■ Canada's pulp and paper industry couldn't have had much more bad luck than it has seen in the last two years. The good news for beleaguered companies is conditions indeed won't worsen. The bad news is they won't get a lot better before the latter part of the year.

Newsprint mills are typical of the country's dilemma. Lagging behind in the race to maintain modern capacity in competitive locations during the 1970s—and troubled by endemic unemployment in some locales—the country responded with a government-sponsored binge of capacity expansion. What it got for its money in the early 1980s was a largely modernized industry in a recession-reduced marketplace.

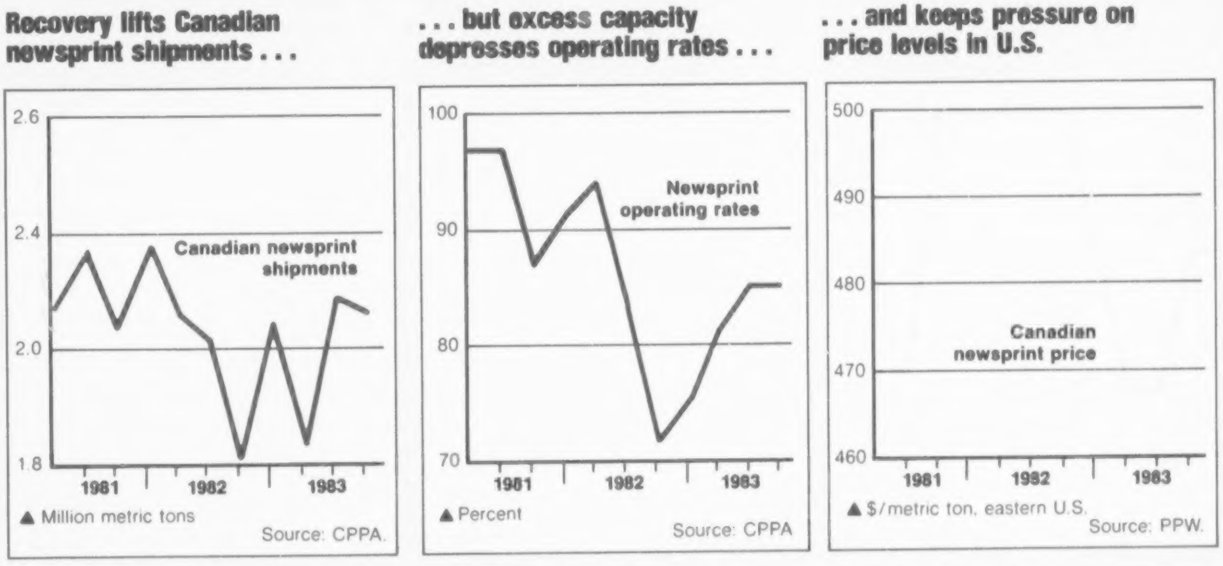
Then in 1982 and 1983, when it became clear that more money thrown at more capacity would only produce more unmanageable debt, the pulp and paper industry shifted its gears and began emphasizing efficiency and quality-improvement.

A Canadian newsprint mill—one of Kruger Inc.'s—had become the standard for the influential *USA Today* and its quality four-color graphics. The industry seemed on the right course. Then, in mid-1983, when the commercial printing industry and its insert and catalog customers—representing the most dynamic end-use group of the entire newsprint/printing/writing paper industry—began to take off, it was coated paper that became a twinkle in the printer's eye, not newsprint.

Fortunately for the Canadian industry, uncoated groundwood—including newsprint machines underutilized producing newsprint—were ready and available to supply paper for those customers who couldn't get all the coated paper they wanted. It now seems likely that the same commercial printing binge, if it continues into 1984, will help pull newsprint demand up by year's end. But it will still take a massive increase in U.S. daily newspaper demand—plus a reversal in the slumping fortunes of Canada's overseas newsprint customers—to soak up all that shiny new capacity added in North America over the last few years.

Market pulp mills were not in much better shape, although prices were on the mend during much of 1983 and seemed likely to recover—in fits and starts—through 1984 as well. As with newsprint, market pulp suffered from an excess of capacity around the world. And more than newsprint, Canada's market pulp industry was still hurting from the double-digit currency devaluations of 1982, which suddenly made Scandinavian producers the most competitive in the world.

Canada's currency won't give much help there, and it may hurt the industry a little on the North American front during 1984. Much of the profit margin of recent years—when there has been a profit margin—depended on a weak Canadian dollar, bouncing around in the US$0.80 to US$0.82 area in 1983 compared with rough parity a few years earlier. Most in the Canadian industry expect their dollar to remain on roughly the same level with the U.S. currency during 1984, although British Columbia Forest Products Ltd.'s H.L. Martin did indicate



Recovery lifts Canadian newsprint shipments . . .

▲ Million metric tons

Source: CPPA.

. . . but excess capacity depresses operating rates . . .

▲ Percent

Source: CPPA

. . . and keeps pressure on price levels in U.S.

▲ $/metric ton, eastern U.S.

Source: PPW.

the Canadian dollar could rise to as high as $0.85 or $0.86, reducing that comforting currency cushion.

If Canada's dollar is strengthening, it will be partly because the country is expected by late 1984 to have regained all the ground lost during the recent recession. Canada's real gross domestic product tumbled by 4.6% in 1982, and the Conference Board of Canada thinks it will take a 2.1% jump in 1983 and a 3.1% rise this year, back up to where it was in the fourth period of 1981.

And despite the slowly accumulating signs of recovery, the nation's horizon remains cloudy, with the 12.0% average unemployment rate of 1983 abating only slightly to a still-high 10.9% figure for 1984.

One sector of the Canadian pulp and paper industry whose performance directly tracks economic activity is tissue, and producers expect a fairly decent increase in demand in 1984. But with Scott Paper Co. starting up a 40,000-metric-tpy machine in New Westminster, B.C., industry operating rates won't be very impressive.

Facelle Co. Ltd. president Brian M. Blakely points out that Kimberly-Clark Corp.'s closing of its Kapuskasing, Ont., mill in 1983 removed 20,000 tpy of capacity. Even with that, however, he believes the Canadian industry's operating rate will fall from 88% in 1983 to 84% in 1984.

This is despite an expected 3% growth rate in the Canadian tissue market in 1984, same as in 1983, led by a 5% to 8% growth rate both years in the "bouyant" towel sector. But Blakely believes napkins will lag, at about 2% each year, while facial and bathroom tissue come in at the average level. Helping Canadian mills will be an expected advance of 5% to 6% in commercial/industrial tissue shipments, coming after an 8% jump in 1983. But Blakely points out this followed a "bad year" in 1982.

NEWSPRINT

Long, slow climb back uphill

Near-depression conditions in the Canadian newsprint industry and actual desperation in the British Columbia segment of the industry will begin to moderate in 1984 as the industry positions itself for a healthy performance in 1985 or beyond. Operating rates are expected to remain low in 1984 by historical standards, however, and few real rays of sunshine have appeared on the immediate horizon. Most of the industry will continue to struggle with downtime, uncertain overseas markets and an industry-wide reluctance to shut down or upgrade the presently excessive levels of capacity.

Most observers expect U.S. consumption to rise by about 4.3%, somewhat better than the 3.5% growth rate Abitibi-Price Inc. marketing vice president William Hall sees for 1983 once final figures are in for that year.

This would bring U.S. demand up to about 10.9 million metric tons in 1984, although St. Regis Corp. senior vice president James Bowersock is somewhat more optimistic, seeing a 5.5% demand rise to about 11.1 million tons. British Columbia Forest Products Ltd.'s H.L. Martin projects demand of just 10.8 million tons, however.

Several observers see Canada's market share in the U.S. rising slightly in 1984, reversing a trend of several years' standing. CIP Inc.'s W.P. Woodworth feels Canadian shipments to the U.S. will rise about 5%—slightly ahead of his view of the increase in consumption—to 6.2 million tons. Pemberton Houston Willoughby's Jaak Puusepp predicts that Canada's share of the U.S. market will edge up from a low of 56% in 1982 to 57% in 1983 and 57% to 57.5% in 1984.

OPERATING RATES. But that doesn't mean Canadian operating rates will return to healthy levels. Puusepp sees rates in the U.S. climbing from just under 89% in 1983 to a little more than 90% in 1984, while Canadian rates climbfrom 84% to 87%. BCFP's Martin is more pessimistic, forecasting rates of 81% in Canada for 1983 and just 85% in 1984. Western Canada is obviously in worse shape than the rest of the continent, and Puusepp forecasts an operating rate of just 79% in 1984 for that part of the country, compared with 71% in 1983; Martin's forecasts are one point lower still.

Most agree that the U.S. industry will continue to outperform its Canadian competitors. Abitibi's Hall believes U.S. mills were running at around 90% at the end of 1983 and will operate at 92% to 93% in 1984. St. Regis's Bowersock feels U.S. mills will run at 93.5% this year after averaging 88% in 1983.

One sign of poor operating conditions has been an excess of newsprint inventories at mills. Puusepp believes North American mill stocks, having risen 73,000 metric tons in 1983, will fall by 90,000 tons in 1984.

Consumer inventories are always much more volatile, and observers seem to disagree about what is going to happen there. One executive with a southern U.S. newsprint manufacturer predicts consumer inventories will rise 10% in the first half of 1984 and drop by the same amount in the fourth quarter after ending 1983 unchanged from 1982. Crown Forest predicts a 150,000-metric-ton drop in consumer inventories in 1983 followed by a 50,000-ton increase in 1984. Woodworth forecasts no change in 1984 after a 100,000-ton drop in 1983, while Puusepp agrees with Woodworth's 1983 number but sees stocks dropping another 65,000 tons in 1984. And BCFP's Martin expects consumer stocks to rise 50,000 tons after a 150,000-ton loss in 1983.

One question in terms of Canadian suppliers' ability to operate consistently through the year is the pattern of region-wide as opposed to local labor negotiations. British Columbia talks dragged on through late 1983, and the industry in eastern Canada faces negotiations in the spring of 1984. But most executives believe organized labor recognizes the condition of the Canadian industry and won't try to take mills to the mat this time.

IMPORTS FROM OVERSEAS. Several executives admit that threatened mill shutdowns caused by labor disruption could cause worried publishers to buy from foreign suppliers. And for various reasons, publishers have been doing just that.

Most executives agree on that fact, but there the concensus ends. Puusepp places U.S. imports from overseas at 48,000 tons in 1983 and 20,000 tons in 1984. St. Regis's Bowersock has a similar estimate of 54,000 tons and 18,000 tons. Martin picks a much higher number: 100,000 tons in 1983 followed by 120,000 tons in 1984. Abitibi's Hall estimates overseas imports to the U.S. at 80,000 tons for 1983; Crown Forest agrees with that and

North American newsprint operating rates

	1983	1984
United States	88.6%	90.2%
Canada	83.7	87.4
Eastern Canada	86.5	89.2
Western Canada	71.2	79.0

Source: Jaak Puusepp, Pemberton Houston Willoughby Inc.

goes on to forecast 1984 levels of 100,000 tons. Woodworth goes along with that estimate for 1984 but uses a lower figure—50,000 tons—for 1983.

One thing none of these observers disagrees on is the source of the troubling import tonnage: Scandinavia. The only difference seems to be over where the imported newsprint will go. Puusepp and one or two others see it ending up on the West Coast, while Woodworth notes that "import penetration has already reached [the] East Coast—Boston [and] Philadelphia" and Hall and Martin both foresee some penetration of the East Coast as well.

In the past, Canadian mills have often been able to shift unneeded tonnage from the U.S. to overseas customers in weak markets, but with overcapacity a global problem in 1983 and with all major markets depressed that clearly did not happen this time. Abitibi's Hall was forecasting a 5% drop in 1983 from the 1.525 million metric tons Canada shipped offshore in 1982. Crown Forest agrees with that estimate and projects just a 1.7% jump in 1984 offshore shipments. CIP's Woodworth sees a lower number for 1983 and 1984, projecting 1.35 million tons last year and 1.4 million for this year.

EEC IMPORT QUOTA. One important question in determining offshore shipments, obviously, is whether the January 1984 entry of the Scandinavian nations into the European Economic Community has any effect on Canada's duty-free quota for shipping newsprint to the EEC. One southern U.S. producer estimates it would reduce Canadian shipments by 100,000 tons, while Woodworth points out that such quota changes generally take time to implement and that there would be "probably no immediate effect in 1984."

Crown Forest notes any quota change would have little effect if the quota does not fall below 750,000 tpy (the quota for all non-EEC producers, including the Scandinavians, is currently 1.5 million tpy, and 750,000 tpy would approximately represent current Canadian shipment levels to the EEC). Hall and Puusepp simply agreed that, in Puusepp's words, "there will be a successful outcome to these negotiations." Puusepp also notes that "the EEC is not a growth area."

Some Canadian mills have responded to poor demand from overseas and from their traditional U.S. customers by invading new market areas in the U.S. Crown Forest comments that "in the first half of 1983, eastern Canadian mills shipped into the western U.S.A.—traditionally dominated by western Canadian producers."

Crown Forest and others note that by the second half of 1983, western Canadian tonnage was also showing up in areas normally dominated by eastern mills, although as BCFP's Martin points out, the tonnage shipped into eastern territories "appears minor compared to [the] flow of eastern Canadian and Scandinavian tonnage into western markets."

The reason for this movement of western paper into eastern areas seems obvious. Most observers cite the $55/metric-ton price advantage held by western newsprint over the eastern product as the major reason. The consensus is that this price differential will diminish and, with it, the western move into eastern provinces.

Many observers believe a slow trend toward shutdown of old machines will continue, but none predict any of the big jumps that some think are necessary to rectify the present supply/demand imbalance.

St. Regis's Bowersock, however, notes that about 435,000 tpy of capacity was either shut down or converted to groundwood specialties in 1983, three-quarters of that amount in Canada and the balance in the U.S.

Puusepp believes a further 80,000 tpy of capacity will leave the ranks of standard newsprint machines in 1984—all of that in Canada and half of it through upgrading, with the balance being shut down permanently.

One southern U.S. executive predicted a 100,000-ton to 150,000-ton swing out of newsprint through upgrades or shutdowns, without specifying which course will predominate, while several executives did not predict any shutdowns or upgrades this year.

What most do see in the future for newsprint capacity is a shift from spending for higher output to spending for lower costs and higher product quality. Abitibi's Hall cites the impact of the Gannett daily *USA Today* on publisher quality needs and comments "publications have set new newsprint quality targets, and we believe suppliers have recognized the need to meet those targets."

Crown Forest notes that "demand for improved sheet appearance will tend to push producers into state-of-the-art equipment (i.e. twin-wire equipment)."

RISE OF INSERTS. One force behind the move to improve sheet appearance is the recent strength of the newspaper insert market, although most executives seem to feel the newsprint sector of that market will grow at a slower rate than demand for groundwood specialties going into inserts. Bowersock sees an 8% volume rise in preprinted inserts in 1984, with newsprint demand for that end use growing "at a slightly lower rate," while BCFP's Martin forecasts inserts up 5%, with the newsprint portion rising just 2%. Abitibi's Hall actually sees a rise of as much as 10% in the insert market, and Woodworth sees growth in both inserts overall and inserts printed on newsprint at about 5%.

UNCOATED GROUNDWOOD

Enjoying LWC's coattails

During the summer of 1983, uncoated groundwood mills in North America began to ride the crest of a wave that had already started pushing coated groundwood mills ahead during the middle of the year. Executives believe this pickup, which began so suddenly and dramatically, will continue in 1984 barring the unforeseen.

What the unforeseen means to most executives is any significant slowdown in commercial printing without a corresponding increase in newsprint demand. Such a situation would pull uncoated groundwood mills down due to the same overcapacity that hangs over the entire spectrum of groundwood papers.

Observers today are optimistic. Jones Heward & Co. analyst Brian Topp said at *P&P*'s recent *First Uncoated Groundwood Papers Conference* that he expects to see operating rates for Canadian mills hit 91% this year, up from 85% in 1983. His forecast for U.S. mills in 1984 is 90%, up from 85% last year. And he sees both countries' industries running at a healthy 94% in 1985.

St. Regis Corp. senior vice president James Bowersock agrees with Topp's 1983 number for the U.S. but puts U.S. mills at a slightly higher 90.7% in 1984, while CIP Inc. senior vice president W.P. Woodworth is more bullish: he places Canada at 92% this year, up from 90% in 1983, and the U.S. at 94%, up from 92% last year.

COMMERCIAL PRINTING BOOM. This improvement in the industry's operating rate, assuming it happens, will bepowered largely by a growth in commercial printers' demand for advertising and promotional pieces that is proving so strong it has helped the coated groundwood industry absorb a net increase in annual capacity of 578,000 tons between 1981 and 1983. With uncoated groundwood mills adding only about half that amount during those years, the uncoated sector of the groundwood industry was in a good position to serve as a marginal supplier for commercial printers who could no longer secure added amounts of paper in late 1983.

Most industry executives see this trend continuing in 1984. Abitibi's Hall sees U.S. uncoated groundwood consumption rising by 5% to 6% in 1984, and Topp forecasts a rise of 7.2% to 3.4 million metric tons.

Not all of this increase in paper consumption will be supplied by North American sources. Hall places U.S. uncoated groundwood imports from overseas in 1983 at 100,000 metric tons, and adds that "we expect those sources to attempt further penetration as long as their traditional markets remain oversupplied." Most observers cite Finnish and Swedish mills as the major importers of groundwood specialties to the U.S.

Woodworth expects Canadian groundwood mills to increase shipments by 4% in 1984 after a 3% rise in 1983, while Bowersock's estimates for the U.S. call for a 2.7% increase in 1983 and then a jump of 5.7% this year.

Jaakko Pöyry International Oy's Magnus Diesen told the same conference participants that he believes the total North American market for uncoated groundwood papers totals 3.0 million metric tons, of which 1.0 million is rotonews. Of that 1.0 million tons, half goes to "newspapers and magazines" and another 30% goes to "supplements, mail and inserts." North American observers see the insert market for groundwood papers as a fast-growing opportunity, at least in 1984. Estimates of insert volume growth in 1984 range from Woodworth's 5% to Hall's 10%, with a consensus forming around Bowersock's 8% estimate.

And uncoated groundwood is expected to outpace standard newsprint in serving the insert market, with estimates for newsprint growth in inserts ranging from the 2% of British Columbia Forest Products' H.L. Martin to Bowersock's belief of a "slightly lower rate" than the 8% overall increase in inserts. Only Hall offers the opinion that "we don't expect major shifts in the share of newsprint vs groundwood papers."

CAPACITY TRENDS. While major opportunities in the insert, catalog and magazine market do exist, a question does remain in terms of how much money the industry will have available for future capacity expansion or modernization. Topp told conference participants that while "the underlying fundamentals which underwrote the substantial success enjoyed by this 'Super News' segment are still largely in place," peak operating profits during this market cycle are likely to lag those of the last cycle by as much as 15%.

By some estimates, world newsprint capacity is in excess of fundamental demand by 2 million tpy, half of that in North America. Uncoated groundwood has long been seen as a possible alternative market for some of this excessive newsprint capacity—despite the potentially harmful impact that an upgrading of hundreds of thousands of tons of newsprint capacity would have on the uncoated groundwood industry. ■

MARKET PULP

Prices should begin to firm

Rising shipments and declining inventory levels should enable Canadian and U.S. market pulp producers to raise prices in 1984 and restore badly needed profitability, although exchange rates remain a major uncertainty, according to industry observers.

North American and Scandinavian (Norscan) chemical paper-grade pulp shipments through the first nine months of 1983 were up 18.0%, with shipments from Canada up 15.2% from year-earlier levels. Inventories, however, remained relatively high at 1.5 million tons at the end of October, down from 1.6 million tons at the end of 1982 and the recession high of 1.9 million reached in August 1982.

The combination of high inventory levels (mainly for softwood) and the strong U.S. dollar contributed to soft pricing through 1983—particularly in Europe. The rise of the dollar increased the price of pulp for European customers in local currencies and also gave Swedish pulp producers a significant cost advantage and enabled them to price competitively.

As a result, producers achieved little success in bringing the price of benchmark northern bleached softwood kraft (NBSK) pulp up to the list of $440/metric ton in Europe and $450 in the U.S., which was first announced for Mar. 1, 1983. In the fourth quarter of last year, NBSK was still trading in a range as much as $20/ton below list.

INVENTORIES COMING DOWN. Most industry executives and analysts, however, are optimistic that pulp prices will finally begin to firm in 1984.

William H. Vaughan, vice president, market planning and development, BC Timber Ltd., projects that Norscan chemical paper-grade pulp shipments rose to 15.5 million tons in 1983 (just below the record of 15.7 million metric tons reached in 1980) from 1982's recession low of 13.3 million tons, and shipments should go well over 16 million tons in 1984.

Historically, two factors must be present for pulp prices to rise, according to Vaughan. Shipment-to-capacity rates must hit at least 87% on a rising trend in demand, and Norscan inventories must fall to 1.2 million tons or below and be on a downward trend.

"We already have the first condition with the three-month moving average for shipment-to-capacity rates reaching 88% in September and 90% in October," says Vaughn. "My estimate is that Norscan inventories will hit the 1.2-million-ton level in January or February of this year, enabling price increases to stick with a minimum of discounting."

He projects that by the end of 1984 the price of NBSK "will be approaching its previous high and will surpass that level in 1985." The previous peak for NBSK was $545/metric ton in Europe and $530 in the U.S. which was reached in 1981.

EXCHANGE RATE UNCERTAINTY. Ross Hay-Roe, publisher of *PaperTree Letter*, expects acceptance of the recent $50/ton price increase on NBSK to $490 in Europe and $500 in North America that goes into effect Jan. 1, although discounting will not begin to disappear until later in the first half. This will set the stage for another $50 to $60/ton increase at midyear, taking the list price in Europe to around $540, he says. This would result in an average list price for the year of $515, although transaction prices might average closer to $490.

"One of the differences in the current cycle from previous recoveries is the fact that producers haven't minded raising prices even though they are not getting current list prices," Hay-Roe says. The reason for this is the serious need of all producers, with the exception of Swedes, to stem losses and improve profitability.

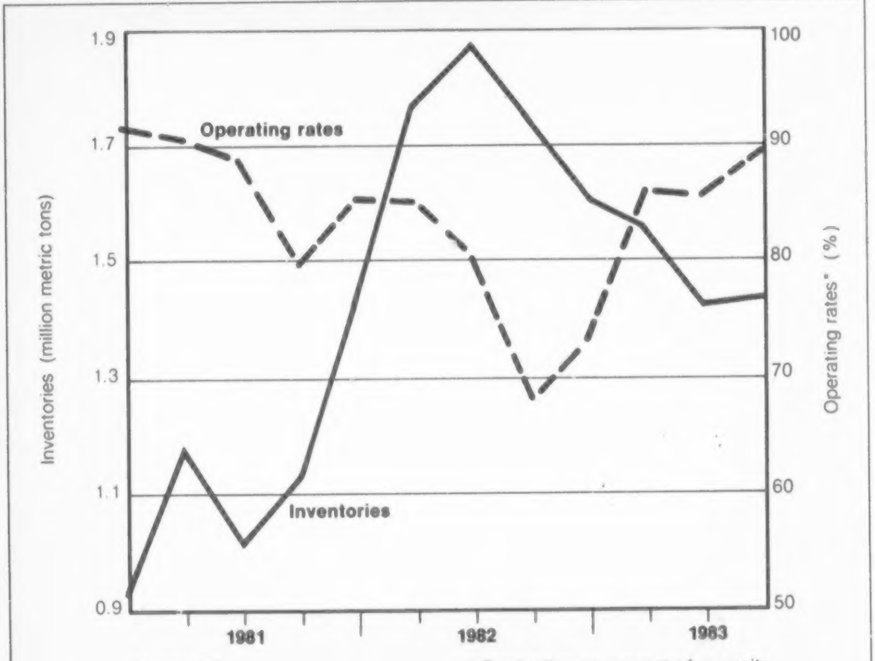
But this points to another unusual feature Hay-Roe sees in the current pulp market recovery. "Assuming the maintenance of current exchange rates, North America is going to be a lot stronger than most other markets and this is going to make it difficult to keep prices up consistently," Hay-Roe notes.

COST PRESSURE IN SWEDEN. "Customers in the U.S. should have no trouble swallowing the $50/price hike announced for Jan. 1, but customers in Europe may choke on it," Hay-Roe says. This will give the Swedes a great incentive to come in and play hero by offering pulp in French francs and Italian lira—and this is already beginning to happen."

Vaughan, however, notes that Sweden accounts for only about 20% of total Norscan pulp capacity and producers there are already beginning to operate full out—which historically has been slightly above the 90% level for a sustained period.

Swedish producers will also face mounting cost pressure, giving them less room to maneuver on prices. "Unlike most businesses, costs for the last few units of production in pulp tend to rise as mills start having to get marginal wood," Vaughan says. "For the Swedes, this means importing woodchips at a high cost from the U.S. or going to landowners who don't really want to sell their timber unless they are paid high prices for it." ■

North American and Scandinavian operating rates and producer inventory levels for chemical paper-grade market pulp, 1981-83



Source: PPW.

* Production as percent of capacity

Growth forecast for world white paper and pulp consumption and Norscan market pulp shipments, 1981-85

	% change from previous year				
	1981	1982	1983e	1984e	1985e
World GNP/GDP	+1.7%	—	+2.5%	+3.5 to 4.2%	+3.0 to 3.5%
Printing/writing paper apparent consumption	—	—	+5.6	+5.2	+5.0
White pulp consumption (integrated and market)	+0.3	−2.1	+4.2	+4.7	+6.4
North American/Scandinavian white market pulp shipments	−5.5	−12.7	+16.5	+11.0 to 14.0	+7.0 to 10.0

Source: William H. Vaughan, BC Timber Ltd.

LABOR

Bargaining to focus on eastern Canada

■ Labor negotiations in Canada will swing again this year to the east from British Columbia—although as this issue of *P&P* was going to press it appeared as if western talks might continue into 1984 and possibly coincide with the expiration of eastern contracts. In the U.S., labor agreements will expire at about 130 mills, with nearly 80 of them in the South and Midwest.

Observers generally feel 1984 may be a tough year for bargaining. As the economies in Canada and the U.S. begin to show pronounced improvements, unions are likely to demand more from industry than in the past two years of recession. Since 1981, unions have agreed to some concessions in an effort to improve industry profitability, but now they are likely to be seeking to recoup their own losses, say some observers.

Already late in 1983, it was apparent that U.S. unions were less hesitant about using strikes as bargaining ploys. The number of strikes as of Nov. 1 increased to 18 from 11 the year before, according to the American Paper Institute. (A strike at St. Regis Corp.'s Monticello, Miss., mill late in November increased the 1983 year-to-date toll to 19.)

In Canada, though, only a few brief and intermittent work stoppages occurred as the industry in British Columbia attempted to reach a settlement with its unions late in the year. Negotiations had dragged on for several months with no apparent progress, but both sides remained reluctant to take drastic action. A lockout initiated by the industry in October, however, idled some pulp mills for several days.

MODERATION IN DEMANDS. In late November, British Columbian employers were still seeking a contract of three years' duration, with no cost increase in the first year and changes in work rules and other operating procedures—such as downtime and holiday time—in an effort to improve efficiency and reduce expenses.

The unions wanted a one-year package with some pay improvements and were resisting any of the industry's proposals for procedural changes.

In eastern Canada, most contracts expire on Apr. 30. The Canadian Paperworkers Union represents most workers in the region. Expiry dates in the U.S. industry—where most employees are members of the United Paperworkers International Union—vary widely.

EASTERN CANADIAN BARGAINING. It appears from preliminary indications a year ago that eastern Canadian companies will be adamant about moderating labor cost increases this year. Last January some employers sought to reopen the second year of the two-year contract ratified in 1982, but the CPU refused. Companies claimed the recession had severely depleted revenues and a one-year wage freeze would have helped maintain competitive positions. The present eastern contract, which took effect May 1, 1982, calls for pay hikes of 12% the first year and 10% the second year.

The CPU has not yet decided on its goals in reaching a new agreement this year. Those will be determined at a conference scheduled to begin Jan. 23. The CPU is by far the largest union in the Canadian paper industry. This year about 25,000 of its members are covered by expiring contracts.

CPU president James Buchanan recently indicated that current economic conditions will be considered when the union determines its agenda for this year. He said that the union has never agreed to concessions but would be "realistic" in setting its goals in 1984.

Unions have been prone to stage extensive strikes in the eastern Canadian industry in prior bargaining years. One of the exceptions was in 1982, when only one mill was idled. It involved Scott Maritimes Ltd.'s 600-tpd bleached kraft pulp mill in Abercrombie Point, N.S., which was struck for several months by the CPU. With the economy improving, though, some observers feel labor strife will be more prevalent this year.

EAST MAY GET PARITY WITH WEST. Negotiations in 1982 were overshadowed by continued weakness in demand for newsprint, groundwood specialties and pulp. Currently, these markets are starting to pick up, with groundwood specialties becoming quite strong, leading some industry executives to suspect that the union will try to get higher wage settlements than two years ago.

Other observers, however, feel the industry will stubbornly adhere to a goal of reducing labor costs to cut losses incurred over the past two years. The agreement ratified in British Columbia will also have an effect.

The CPU will likely include pension plan indexing as a major issue on its agenda again this year. Two years ago, the union was only successful in getting the indexing—which calls for automatic cost-of-living adjustments in pension payments—in its contract at Abitibi.

In past years, eastern Canadian unions have tried to reach wage parity with their western counterparts but haven't succeeded. This year, however, that goal could be realized. If a modest wage increase is included in the contract being negotiated in British Columbia—as is expected—wage rates in the East have a better chance of catching up with wage rates in the West, where the base pay until June 30, 1982 was C$12.96 vs C$12.52 in the East as of May 1, 1983.

U.S. ISSUES. Labor bargaining in the U.S. will focus in the Midwest and Pacific Coast. Labor agreements expire at 18 eastern mills, 28 New England mills, 5 southern mills, 39 midwestern mills, and 40 Pacific Coast mills, according to API.

In recent years, there has been a moderating of U.S. wage increases, and they have remained significantly lower than in Canada. According to API, the average first-year wage increase negotiated in 1983 was highest in the South, at 5.9%, and second highest in New England, 5.8%. It was lowest in the Pacific area, 2.0%.

Richard P. Klinzing, API's vice president of employee relations, feels that the contract settlements of 1982-83 will have a moderating influence on bargaining this year. Health care cost-containment and productivity issues will continue to be high priority items, he notes.

In 1983, depressed order backlogs set the tone for labor negotiations, making it necessary for management to be particularly resolute in resisting union demands for costly benefit changes and unreasonable wage increases, Klinzing notes. "If the economy picks up in 1984, unions will likely be less responsive to management's long-run economic concerns. However, events over the last two years have convinced some that job security and employer profitability are intertwined," he believes.

P&P labor columnist Julian Kien, however, feels 1983 settlements were surprisingly generous given the weak condition of the industry and the modest contracts ratified in other sectors. This resulted in relatively high wage rates in the pulp and paper sector, he believes.

Wayne E. Glenn, UPIU president, said bargaining in 1983 was extremely difficult and unusually time consuming, primarily due to management's attempt to reduce health care coverage and have employees share more of those costs. He feels these items—in addition to wages—will be major issues in 1984.

LOWER LABOR COSTS SOUGHT. Kien feels bargaining in 1984 will be a continuation of 1983—declining wage trends, competitive work practices, and expansion of health care cost-containment programs. He feels both unions and the industry realize there is a need to modify costs and improve productivity.

Glenn, however, doesn't expect contracts ratified over the last two years to have much of an impact on settlements this year. He notes that the last two years were recession years, while 1984 should be a recovery year. He foresees higher wages and better fringe benefits than in 1983 settlements. ■

Major contracts by region on 1984 U.S. paper industry bargaining calendar

Company	Mill location	Union	No. of employees	Contract expires
New England region				
St. Regis	Bucksport, Maine	U,I,B	992	4/30
Intl. Paper	Jay, Maine	U	1,100	5/31
Pejepscot Paper	Pejepscot, Maine	U,I,O	231	6/16
Strathmore (Hammermill)	Turners Falls, Woronoco, Westfield, Mass.	U	457	6/30
Georgia-Pacific	Gilman, Vt.	U	168	7/1
James River	Hyde Park, Mass.	U	166	7/1
GN Nekoosa	Millinocket, E. Millinocket, Maine	U,O A,B,O	1,6[illegible]8 772	7/31 7/31
James River	Fitchburg, Mass.	U,O	482	7/31
Georgia-Pacific	Woodland, Maine	U,A,B,O	299	9/1
Madison Paper	Madison, Maine	A	184	9/15
James River	Old Town, Maine	U	721	9/30
Fraser Paper	Madawaska, Maine	U,O	928	10/31
Eastern Fine	Brewer, Maine	U	374	11/30
Eastern region				
P.H. Glatfelter	Spring Grove, Pa.	U	811	1/16
Intl. Paper	Corinth, N.Y.	U	466	5/31
Hammermill	Erie, Pa.	U	1,348	6/10
Crown Z	Carthage, N.Y.	U	308	6/30
Georgia-Pacific	Lyons Falls, N.Y.	U	218	8/10
Scott Paper	Chester, Pa.	U	1,750	9/27
Garden State	Garfield, N.J.	U	207	10/1
Georgia-Pacific	Plattsburgh, N.Y.	U	515	10/1
Westvaco	Covington, Va.	B	1,132	3/1
James River	Richmond, Va.	U	175	4/27
Bowater Southern	Calhoun, Tenn.	U	1,160	7/2
Champion Intl.	Canton, N.C.	U	1,704	8/31
Midwest region				
Boise Cascade	International Falls, Minn.	U,A,B,O	883	4/30
Consolidated Papers (five divisions)	Stevens Point, Wisconsin Rapids, Wis.	U,A,B,O	2,626	4/30
James River	Green Bay, Wis.	U	965	4/30
Gilbert (Mead)	Menasha, Wis.	U	285	4/30
Crystal Tissue	Middletown, Ohio	U	239	5/1
Georgia-Pacific	Kalamazoo, Mich.	U,O	301	5/1
Nicolet Paper	DePere, Wis.	U	362	5/31
Weyerhaeuser	Rothschild, Wis.	U	370	6/1
Manistique	Manistique, Mich.	U	165	6/15
Potlatch	Brainerd, Minn.	U	573	6/15
Potlatch	Cloquet, Minn.	U,O	954	6/15
Scott Paper	Muskegon, Mich.	U	744	6/15
Appleton	Combined Locks, Wis.	U	534	6/30
Fletcher Paper	Alpena, Mich.	U	150	6/30
Mosinee Paper	Mosinee, Wis.	U	470	6/30
St Regis	Battle Creek, Mich.	A,O	567	6/30
Wisconsin Tis.	Menasha, Wis.	O	483	6/30
Stone Container	Coshocton, Ohio	O	211	7/1
Pope & Talbot	Eau Claire, Wis.	O	631	7/14
James River	Kalamazoo, Mich.	O	964	7/24
Champion Intl.	Ontonagon, Mich.	U	221	7/31
Pope & Talbot	Ladysmith, Wis.	O	156	7/31
Thilmany (Hammermill)	Kaukauna, Wis.	U	1,250	7/31
P.H. Glatfelter	Neenah, Wis.	U	377	8/1
Beckett Paper	Hamilton, Ohio	U	357	10/1
Pacific Coast region				
Southwest For.	Snowflake, Ariz.	U,B	431	3/1
Boise Cascade	Wallula, Wash.	W	442	3/14
Louis.-Pacific	Antioch, Calif.	W	328	3/14
Weyerhaeuser	Cosmopolis, Wash.	W	288	3/14
Weyerhaeuser	Springfield, Ore.	W	462	3/14
Boise Cascade	St. Helens, Ore.	W	504	3/15
Boise Cascade	Vancouver, Wash.	W	295	3/15
Intl. Paper	Gardiner, Ore.	W	209	3/15
ITT Rayonier	Pt. Angeles, Wash.	W	866	3/15
Weyerhaeuser	North Bend, Ore.	W	143	3/15
Weyerhaeuser	Everett, Wash.	W	220	3/15
Weyerhaeuser	Longview, Wash.	W	1,009	3/15
Grays Harbor	Hoquiam, Wash.	W	250	3/15
ITT Rayonier	Hoquiam, Wash.	W	184	3/16
Georgia-Pacific	Bellingham, Wash.	W	810	4/30
Georgia-Pacific	Toledo, Ore.	W	458	4/30
Simpson Paper	Ripon, Calif.	W	17[illegible]	4/30
Boise Cascade	Steilacoom, Wash.	W	185	5/31
Champion Intl.	Missoula, Mont.	U	605	5/31
Longview Fibre	Longview, Wash.	W	1,009	5/31
Louis.-Pacific	Ketchikan, Alaska	B,W,O	396	5/31
Louis.-Pacific	Samoa, Calif.	W	56	5/31
St. Regis	Tacoma, Wash.	U	493	5/31
Crown Z	Antioch, Calif.	W	172	6/1
Crown Z	Los Angeles, Calif.	W	288	6/1
Crown Z	Pt. Angeles, Wash.	W	295	6/1
Crown Z	West Linn, Ore.	W	622	6/1
Scott Paper	Everett, Wash.	W	1,373	6/1
Simpson Paper	Eureka, Calif.	W	170	6/30
Potlatch	Lewiston, Idaho	U,B,O	1,072	6/30

U = United Paperworkers Intl. Union; A = Intl. Assn. of Machinists & Aerospace Workers; B = Intl. Brotherhood of Electrical Workers; W = Assn. of Western Pulp & Paperworkers; O = Other.

Source: American Paper Institute Employee Relations Dept.

ENERGY

More moderation expected in fuel costs

■ Continuing the trend begun in the early 1970s, U.S. pulp and paper companies further reduced their dependence on fossil fuels and other forms of purchased energy in 1983. Adjusted for changes in capacity use, environmental energy use and fuel mix, energy efficiency was up 2.3% in the third quarter compared with a year earlier—and 38.1% compared with 1972—according to American Paper Institute statistics. Self-generated and residual sources of energy accounted for 55.9% of the industry's total energy consumption during the third quarter of 1983, up from 53.8% in the year-earlier quarter, API said.

The paper industry's emphasis on energy efficiency shows few signs of abating over the next several years. A recent *P&P Project Report* survey showed energy-related projects at 29 U.S. and 11 Canadian mills, the majority designed to use woodwastes or other self-generated fuels. In projects where fuel sources were indicated, 58% of the power boilers being installed or proposed for U.S. mills will be able to burn woodwastes. The figure for Canada is 64%.

Another development is the trend to coal, which now runs a close second to natural gas as a source of purchased energy (see table). Of the boiler projects now in the planning stage at U.S. mills, 70% are expected to use coal in their fuel mix.

Underscoring industry's big shift away from oil, only three of the boiler projects noted in the *P&P* survey will use oil as a major fuel source.

ENERGY COSTS STABLE. Natural gas prices declined 1% through October 1983 compared with a year earlier, according to the Bureau of Labor Statistics (BLS), and most observers expect only moderate price increases—compared with recent years—for natural gas in 1984. A panel of energy users predicted that natural gas prices would go up 8% in 1984, while Dept. of Energy officials came up with similar numbers, projecting a 10% increase in the price industrial users pay for natural gas. A recent study by the House subcommittee on fossil and synthetic fuels showed that a majority of major pipeline companies were planning to increase their gas prices by April of this year.

Most analysts feel the current supply surplus, pegged at around 4 to 5 trillion ft³, will remain through the winter, virtually guaranteeing adequate supplies even if the winter is severe.

The outlook for oil supplies and prices appears relatively stable for 1984, although the Energy Information Administration expects U.S. oil consumption to rise about 6% in first half of 1984. Price hikes for No. 6 fuel oil—along with natural gas one of the paper industry's highest-cost sources of purchased energy—are expected to be minimal, observers report. Dept. of Energy forecasts a 1.4% jump in the price of No. 6 (residual) fuel oil for 1984, while industrial users on average see price increases in the 4% to 5% range. Prices through October 1983 were up 6% from a year ago, according to BLS data.

Coal prices are also expected to be fairly stable in 1984, but the possibility of a strike by the United Mine Workers adds a note of uncertainty to forecasts. Contracts with the UMW covering 80,000 bituminous coal miners expire in September. Members of the UMW have staged strikes of two months or longer at each of the last two bargaining rounds, and many suppliers are reportedly indicating that a strike is a definite possibility.

DECONTROL FIZZLES. 1983 turned out not to be the year for natural gas decontrol, contrary to what many observers had expected. Shortly before the holiday recess, a much-watered-down version of the Administration's decontrol bill died in the House, while the Senate overwhelmingly rejected two opposed bills, one attempting to add more controls to natural gas and the other to remove them.

The Senate vote in particular highlighted the difficulty of breaking the stalemate on this controversial issue and passing a comprehensive natural gas bill. Most observers now feel that the issue is effectively dead until after the November elections.

The Administration bill would have lifted controls mandated by the 1978 Natural Gas Policy Act, which controls "old gas" prices indefinitely but lifts controls in 1985 from "new gas" discovered since 1977. The bill would have gradually phased out price controls on all natural gas over a three-year period and abrogated certain existing contracts binding gas pipeline companies to producers. ■

Estimated fuel and energy use for U.S. pulp, paper, paperboard industry, first six months

	First six months		
Source	**1972 % of total**	**1982 % of total**	**1983 % of total**
Purchased electricity	4.3	6.4	6.2
Purchased steam	1.1	0.7	0.8
Coal	10.9	12.1	13.9
Residual fuel oil	20.9	12.3	11.0
Distillate fuel oil	1.1	0.3	0.3
Natural gas	21.3	17.0	14.0
Other purchased energy	0.2	0.3	0.3
Total fossil fuel & purchased energy	**59.8**	**49.1**	**46.5**
Hogged fuel	2.0	7.6	9.5
Bark	4.5	5.3	5.4
Spent pulping liquor (solids)	33.2	37.2	37.5
Self-generated hydroelectricity	0.4	0.5	0.5
Other self-generated energy	0.1	0.3	0.6
Total self-generated & residue fuels	**40.2**	**50.9**	**53.5**
Total energy	**100.0**	**100.0**	**100.0**

Source: American Paper Institute

through harsh process areas. It has a maximum length of 20,000 ft/branch. The LCN links universal stations to up to 64 other control room modules. Transmission rate is 5 million bits/sec. Gateways perform data conversion, buffering, and processing required for the interchange of data between process-connected devices and the LCN, and between the LCN and the instrumentation subsystems and computers.

Discrete modules. The history module collects and stores the history of events from every controller in the system for access by any device on the LCN. It also stores general files, up to 300 schematic displays, and 36 help displays. Up to 600 process points (plus another optional 600 points) can be stored in each module. Multiple modules can be added where additional storage or redundancy are required.

The application module permits process calculations and control strategies to be implemented that may not be practical or possible using only process connected devices. A powerful control language in the module enables the user to develop and compile application programs and to insert these, as required, into the normal point processing stream. There is no practical restriction on the length of these user-defined programs.

The computing module can be any model from Honeywell's line of DPS 6 computers. It provides sophisticated user programming in Pascal, FORTRAN, or Assembler languages, and is used when developing complex programs that involve input from many controllers and many process conditions. This module also allows the TDC 3000 to interface to networks of DPS 6 and DPS 8 computers structured under Distributed Systems Architecture (DSA) and to networks operating under Systems Network Architecture (SNA). It can also be microprocessor-based for small, unit-level application processing.

Process connected devices. The BASIC Controller has eight control loops; each loop is processed three times/sec. This controller stores 28 algorithms which can be used in any or all of the eight input/output loops. The Extended Controller has 16 computational slots, each of which is processed two times/sec. It integrates sophisticated continuous algorithms with event-oriented capabilities. Both controllers are used in continuous processes. The Multifunction Controller is used to control continuous and discontinuous processes. Incorporating a powerful sequence language, this controller has the flexibility to handle logic interlocking, full batch control (including recipe definition), and alarm management.

Process interface units (PIUs) perform scanning, alarm checking, and storing of process data. Three types of PIUs are offered: high level, low level, and low energy.

A Data Hiway port permits the integration of the TDC 3000 Programmable Controller as well as those using either the Gould-Modicon or Allen-Bradley Protocol.

SYSTEM RELIABILITY. Reliability features include CRC checking, online testing, and parameter validation to ensure that the system performs satisfactorily even if errors occur. The system itself can diagnose most failures and pinpoint them to the optimum replaceable unit level without intervention by the operator or maintenance technician. Security measures include keylocks and areas of responsibility. Terminals and users can be restricted to certain defined tasks. Redundancy of all devices and modules ensures fault tolerance and systemwide backup in the event of a malfunction. ■

For more information, ON READER SERVICE CARD CIRCLE **203**

PROCESS AUTOMATION

PERSONAL COMPUTER SYSTEM PROVES COST-EFFECTIVE TOOL FOR MB MILL

Based on success with small computers at Pine Hill, Ala., MacMillan Bloedel now plans to install a comprehensive linked system

By DAVID L. DeGROOT

■ Until recently, process engineers in a mill had to rely on the mill computer system or have access to shared mainframes for computer time. However, recent advancements in microcomputers have produced units capable of meeting the requirements of a typical technical department at very reasonable costs. In fact, current trends in the small computer industry are leading toward the linking of several small units to provide the power of larger systems but with greater versatility.

With this in mind, the technical services department at MacMillan Bloedel Inc., Pine Hill, Ala., recently purchased a personal computer system. Although the sys-

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Mr. DeGroot is a process engineer at MacMillan Bloedel Inc., Pine Hill, Ala.

TABLE 1: **Computer system justification.**

Engineering productivity increase	
Manpower equivalent	8 manhour/week
Hourly rate (including benefits)	$20/manhour
	x 52 weeks/year
Subtotal	$8,320/year
Secretarial productivity increase	
Manpower equivalent	8 manhour/week
Hourly rate (including benefits)	$7/manhour
	x 52 weeks/year
Subtotal	$2,912/year
Total yearly justification	**$11,232/year**

TABLE 2: **Computer system cost estimate.**

	Computer system		
	A	B	C
Basic computer system (including monitor, keyboard, dual disk drive)	3,995	3,495	3,355
Letter quality printer	1,545	2,800	1,495
Plotter	1,095	1,095	1,095
Software			
BASIC	300	250	300
Word processing	500	395	495
Spreadsheet	250	275	300
Graphics	300	395	350
Total (minimum requirement)	1,350	1,315	1,445
Miscellaneous computer/ printer supplies	500	500	500
Furniture	500	500	500
Total system cost	**8,985**	**9,705**	**8,390**

tem has limitations, it has generally been a tremendous success. Consequently, the department is currently submitting a request for a comprehensive technical department computer system. The proposed system will incorporate several small computers to form a computer network with links to the mill computer system and, in the future, a millwide data freeway.

IMPROVEMENTS WERE NEEDED. Although small personal computers have been in existence for several years, they lacked both the hardware and software to meet engineers' requirements. In addition, the systems did not function well in a mill environment, and service arrangements were inadequate. Thus, engineering requirements were usually met with the more powerful languages like FORTRAN which, until recently, was only available on large computers. However, upgrades in BASIC software on small systems, improved hardware, and system flexibility have changed this situation.

Current BASIC languages for small systems can now handle complicated arithmetic calculations that use numerous variables. BASIC can now manipulate large data files, formatting the output in a manner rivaling FORTRAN. Minimum internal memory (random access memory or RAM) can be expanded to the megabyte range. Virtually unlimited long-term data storage is provided by an array of floppy disks and hard-disk systems. Consequently, small systems can run large programs for manipulating large data files. This capability makes the current generation of personal computers suitable for use in a technical department.

JUSTIFICATION. Justification for a computer system can come in many forms, although its benefits are often difficult to quantify. In general, a new system results in productivity improvements. Some of the benefits obtained by MB's technical service department include:

- Reduction of engineering time required to perform routine calculations or tasks
- Shifting of the routine load to less technically trained personnel
- Reduction in time required to issue reports and develop the monthly report for the department
- Improved engineering report quality and a reduction in time required for report generation
- Freedom from the mill computer system.

As a result, productivity of the entire department was improved. A monetary justification is outlined in Table 1. This is a conservative estimate based on the additional time required to continue the current services provided by the department should the use of the computer be discontinued. When compared with cost estimates for three leading computer systems, shown in Table 2, the information in Table 1 demonstrates that these systems have a very reasonable payback.

A computer system, however, should not be considered a replacement for technical personnel. There will be a short developmental period during which technical department input will be required prior to receiving any benefit from a computer system. In other words, the computer should be viewed as a tool which, when mastered, will extend the capabilities of the user.

GETTING STARTED. Two main questions are always asked when entering the computer market. Which brand of computer should be purchased? And why buy a computer knowing it will be obsolete the next day? These are important questions since the list of computer manufacturers is very long and technology is advancing rapidly. Fortunately, the answers are not difficult.

Although many small computer manufacturers produce suitable equipment, only a few can provide the flexibility and service required for a mill application. The ability of the manufacturer to support computer servicing is a limiting factor and will reduce the number of choices considerably. The capability to communicate with the mill's main computer, if important, will also eliminate several options. In general, the larger, more diversified companies producing a variety of large and small computers will be the best choice as they offer more hardware and software support for their products.

To answer the second question of impending obsolescence, the justification for purchasing a computer must be considered. Once the justification has been established, as outlined in Table 1, the cost in lost productivity or efficiency that results from not using a computer outweighs any savings generated by postponing the computer purchase. In addition, the rate at which a computer becomes obsolete can be reduced by purchasing equipment from major manufacturers that can offer networking capabilities and hardware/software support which can extend the life of a system.

PURCHASING A COMPUTER. After determining system requirements, conduct a literature review of the promotional material from the various computer manufacturers. Pay close attention to software, service arrangements, and the types of peripheral equipment offered. Although it is possible to build a computer system from equipment of several different manufacturers, it is usually best to stay with one product line, especially with regard to service agreements.

Next, contact the representatives of the companies that best meet the established criteria. Explain the requirements and ask the representatives to elaborate on the capabilities of the equipment. Most representatives will coordinate some type of demonstration and can even provide training programs once a system is purchased. Also, have the representative discuss the communication capabilities of the small system with the mill's main computer. Although this function is not initially essential, it may be the key to achieving maximum utilization of a computer system at a future time.

Finally, request a proposal from each equipment supplier. Since the cost of the system is relatively small, it is more important to choose a system that will provide the required functions and will have the greatest hardware/software flexibility. Saving a few dollars comes second in this regard.

The advantages and uses of a computer have been well documented and need not be elaborated upon. But the fact that computer systems with sufficient capabilities to meet the needs of engineers in a technical department are now available for under $10,000 is important. In the past, engineering systems were major budget expenditures which received lower priorities because they were not absolutely necessary (as in accounting systems) and did not have a direct impact on production or profits. However, expenditure of the type required for the small systems discussed in this article can be easily handled on a mill level. These low costs allow small computer systems to be given the priority they deserve, within the financial guidelines of the company. The ultimate objective of providing a technical department staff with the tools required to keep pace with the rapid advances in technology can thus be accomplished. ■

PROCESS AUTOMATION

ONLINE COLOR MEASUREMENT SYSTEM PROVIDES ACCURATE, RELIABLE DATA

Spectrophotometric system has produced good results at several paper mills; high accuracy can mean substantial cost reductions

By GEORGE M. LORDITCH and PETER M. TUTINI

■ During the past several years, online color measurement has evolved from an engineer's dream to a credible and commercially practical system for giving accurate and reliable color information on a cost-effective basis.

While the need and benefits of an online system have been recognized for some time, its recent acceptance has been spurred by successful efforts in three areas: development of the necessary optical sensor technology, successful integration of the system into papermaking, and the achievement of an acceptable return on investment for the instrumentation.

TECHNOLOGY. The Macbeth online system consists of an optical sensor, information processor, color video monitor, data storage, and supporting software packages. The sensor, which is usually mounted between the calender stack and the reel, performs continuous measurements in a fixed position, either over or under the sheet, depending upon the installation. The spectrophotometric measurements are transmitted to a control and display unit which contains a microprocessor, keyboard, and video monitor readout. A remote alarm module signals any out-of-tolerance condition.

The technology required to adapt this system to the paper industry presented several challenges. These challenges included electro-optical design considerations, environmental survival, and online and offline correlation.

Electro-optical. These requirements were particularly complex. Noncontact measurement was essential, as was the capability to optically stop the motion of the sheet so the image would not be blurred. Special consid-

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Mr. Lorditch is technical director and Mr. Tutini is marketing manager of Macbeth Color Communications, Newburgh, N.Y.

MANAGEMENT

Naval stores industry in a slump despite world economic recovery

Speakers at 10th International Naval Stores meeting detailed the industry's woes of reduced demand for its products, low growth prospects

By KENNETH E. SMITH, Executive Editor

■ More than 200 delegates at the 10th Annual International Naval Stores meeting in Atlanta, Ga., last September heard 15 speakers portray a rather grim outlook for the naval stores industry. Not only had the depressed world economy cut demand for naval stores products, but also many of the industry's customers were finding more attractive substitutes for naval stores products—especially rosin. This situation was reflected in declining third-quarter crude tall oil (CTO) prices as fractionators struggled with high tall oil rosin (TOR) inventories and competition from imported gum rosin from China and Portugal. U.S. rosin inventories stood at more than 63 million lb, forcing fractionators to cut back production or idle capacity.

The expected increase in CTO production as the U.S. paper industry began to resume prerecession output levels did not promise to help the market either. However, at the year-end price of around $120/ton, CTO could be profitably burned as a fuel-oil substitute by some pulp mills. Even so, prices were likely to remain unchanged for several months. Crude sulfate turpentine producers were also burning their production as a substitute fuel, as sulfate turpentine prices had declined to 60¢-65¢/gal from a high in 1981 of $1.90/gal. Sulfate turpentine inventories stood at 3 million gal at the beginning of the fourth quarter.

There was some good news for the industry as at least one producer announced price hikes for its tall oil fatty acid (TOFA) grades, which were slated to take effect in the fourth quarter.

PAPER SIZING TRENDS. Brookshire C. Moore, president of Brookshire C. Moore Associates, explained to delegates the reasons for the declining use of rosin for paper sizing. Moore said that in 1950 the U.S. paper industry used rosin for sizing at a rate of about 16 lb/ton of production. Today, according to Moore, the industry uses only about 4 lb/ton. Altogether, rosin use for paper sizing has declined from 280 million lb in 1950 to 150 million lb in 1982. Reasons cited for this decline were:

- Today's rosin emulsion sizes are more efficient than soap sizes
- Kraft pulping now dominates the industry, and paper made from kraft pulps is easier to size than sulfite pulps
- Improved paper machine additive retention levels and closed whitewater systems reduce size addition requirements
- Computers allow more precise control of paper machine additive addition
- Ball-points have replaced fountain pens as the standard writing instrument, reducing fine paper sizing requirements
- Alkaline sizing technology is becoming more widely accepted and replacing rosin sizing in many uses

Moore noted that hard-sized linerboard, which required rosin addition in the 75- to 100-lb/ton range in 1950, today requires only 12 to 15 lb/ton of rosin.

About 40% of the European printing and writing papers industry is currently using alkaline sizing, allowing the industry to go from filler loadings of about 10% clay to 25% or more of calcium carbonate with equivalent paper performance. U.S. papermakers, who have access to cheaper clay fillers, have not accepted alkaline papermaking as readily. Only about 7% to 8% of the U.S. fine paper industry is currently using alkaline sizing systems. However, Moore predicted that 30% to 40% of the U.S. industry would convert to alkaline papermaking within the next decade.

PRINTING INK TRENDS. Richard E. France, vice president of Sun Chemical Corp., discussed changes in printing ink technology as they have affected rosin size demand. According to France, the U.S. printing ink market is currently a $1.7-billion/year business, and about 3% growth is expected for the next five years. The main growth area is in publication gravure and heatset web-offset inks.

France noted that publication gravure inks remain a large market for resinates based on TOR. However, in Europe a significant percentage of these ink formulations utilize large amounts of special hydrocarbon resins in conjunction with rosin-based materials. The advantages appear to be high gloss, better scuff resistance and better wetting of certain pigments. He predicted the same development in the U.S. once hydrocarbon resins corresponding to the European materials are available. France emphasized that rosin producers must continue to upgrade their products destined for the publication gravure market because they could be severely challenged by hydrocarbon resins in the near future.

Hydrocarbon resins have made massive inroads in the area of high-efficiency heatset web-offset inks for improved gloss on lower-weight coated paper. Only two years ago this market was completely dominated by rosin-based materials, but today half this area has been lost to hydrocarbon resins. These newer hydrocarbon resins made it possible for ink makers to meet printers' requirements for high efficiency, lower maintenance and much higher press speeds.

In the high-performance cover ink area—the high solids formulations and high holdout tabloid inks—ink formulations are still based mainly on rosin resins. The biggest growth is in the high holdout tabloid inks that are replacing publication gravure in many markets. This area is also potentially an excellent opportunity for hydrocarbon resin intrusion.

France noted that the heatset offset market will probably be the highest ink growth area during the next five years, and that rosin resin producers must respond with new technology if they are to hold their current market levels, let alone increase sales volume. This growth area presents an opportunity to blend rosin chemistry with hydrocarbon chemistry to develop hybrid products that would have advantages over each technology.

Commenting on sheetfed offset inks, currently the second largest U.S. ink market, the speaker noted that this market in the U.S. as well as other parts of the world is going through a slow decline. Higher-speed rotary lithographic presses can produce high-quality work at much higher speeds. However, the sheetfed market will continue to be significant, and is largely based on rosin-based ink systems. Hydrocarbon resins are used but in small quantities.

ADHESIVE TECHNOLOGY. Robert W. Wherry, resins market manager for Hercules Inc., discussed the effect of changing adhesives technology on rosin demand. Wherry noted that two changing technological factors in adhesives manufacture will affect the demand for naval stores derivatives: the backbone polymer and the adhesive application method. Manufacturers have begun using block copolymers, polyethylene, and acrylics while moving away from natural and synthetic rubber polymers. The type of polymer used affects the polymer modifier used. Many of these polymer modifiers are made from sulfate terpenes (alpha and beta pinenes, turpentine and wood terpenes), citrus peel or stripper oil, rosin oil, and even from pitch itself. However, petroleum hydrocarbon derivates have become more popular recently. In block copolymer hot-melt systems a C_5 aliphatic hydrocarbon resin is the preferred modifier in many end uses. The C_5 polymer has better initial color stability, less odor, and has had a more stable availability and price history than rosin-based resins.

The most recent development in applications technology is foam. Foamed adhesives use air to extend the adhesive mass. The obvious impact of foaming is that the process reduces the amount of all ingredients needed to produce the adhesive.

Wherry concluded that the demand for naval stores derivatives in adhesives has peaked and that any growth in this area will probably be met by hydrocarbon resins. New naval stores products are needed that are price competitive, pale colored, stable, and have the proper solubility/compatibility for each particular polymer if naval stores are to regain their lost market share.

WORLD ROSIN SITUATION. Walter L. Cleaver, president of PDM Inc., described the rosin supply and demand picture in the U.S. and the history of the U.S. rosin industry. Cleaver presented figures (Table 1) for U.S. production of gum, wood and TOR. The U.S. gum rosin industry has almost disappeared due to its labor-intensive nature. Only an estimated 4,500 tons of gum rosin were produced in the U.S. in 1983. Gum rosin imports into the U.S. from China, Portugal, Mexico, Nicaragua and Honduras amounted to an estimated 30,000 tons (Table 2) the same year.

TOR accounts for more than two-thirds of U.S. rosin production (Table 3), and plays a vital role in the supply, demand and economics of the world naval stores indus-

TABLE 1: **U.S. rosin production (000 tons).**

	1964	1973	1983
Gum	98	20	4.5
Wood	260	175	100.0
TOR	146	220	205.0
Total	**504**	**415**	**309.5**

TABLE 2: **U.S. gum rosin situation (tons).**

	Production	Exports	Difference	Imports
1979	6,000	4,500	1,500	12,150
1980	5,886	3,596	2,290	8,000
1981	5,095	2,833	2,262	5,500
1982	4,500	2,126	2,374	4,900
1983 (6 mon)	2,000	1,456	544	15,000

TABLE 3: **U.S. tall oil rosin situation (000 tons).**

	TOR production	Domestic use	Exports	TOR beginning inventory	TOFA beginning inventory	CTO beginning inventory
1977	201	164	27.5	19.5	13.5	54.1
1978	212	176	37.5	30.5	17.7	50.9
1979	232	195	49.0	29.0	26.0	72.5
1980	224	186	43.0	15.0	25.9	61.9
1981	222	185	26.0	8.0	64.3	61.2
1982	195	169	17.5	19.0	47.9	72.6
1983e	205	185	15.0	27.0	28.9	89.0
1984e	210	195	25.0	32.0	20.0	100.0

try. However, Cleaver also noted gum rosin represents more than half of the world's rosin needs. With labor costs likely to increase in the producing areas of the world, the cost of gum rosin is likely to drift up, further extending the life expectancy of the existing wood rosin industry, and may support new wood rosin operations where ideal labor and stumps and/or timber stands can be profitably developed.

Wood rosin production is currently controlled on an "as needed" level of roughly 100,000 tons/year with a comfortable supply of stump stocks and capable of a short notice, sharp increase in production. The life expectancy outlook of wood rosin producers has improved substantially with a successful extended commercial evaluation of paraquat stimulation to generate high resin stumps from greenwood after two or three years of treatment.

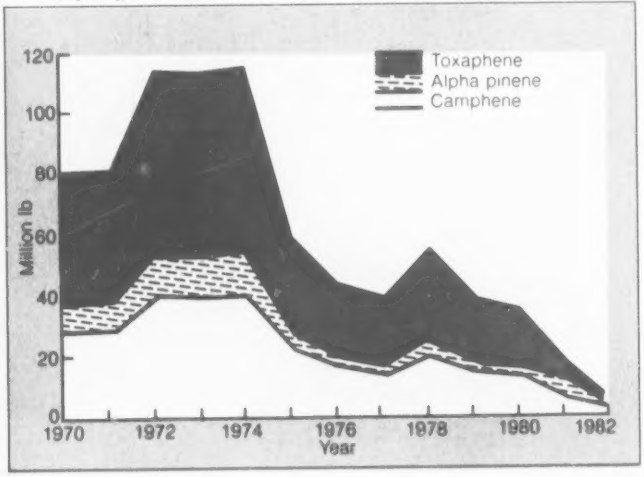
Antonio J. Ferreira, president of Sociedade Central Resinas, Lisbon, Portugal, gave a summary of the gum rosin production outlook in his country. Ferreira noted that Portugal has a forest area of 7.4 million acres, nearly half of which is pine. The production of crude gum rosin in the 1982-83 season was an estimated 140,000 tons, which distills out to 107,000 tons rosin and 25,000 tons turpentine. In the 1981-82 season 136,000 tons of crude gum were distilled to 101,000 tons of rosin and 23,000 tons of turpentine. Portuguese rosin exports in 1982 were 100,000 tons, and in 1981, 81,000 tons. The rosin market price in November 1982 was about $390/ton.

The rosin supply situation in Japan was the subject of a presentation by Yoshihiro Hasegawa, director of Harima M.I.D. Inc., Osaka, Japan. Hasegawa noted that for the last five years Japan has imported annually an average of 69,000 tons of CTO, 64,000 tons of rosin, and 7,000 tons of turpentine.

Imports account for approximately 73% of all rosin use in Japan. About 60% of the rosin imports are gum rosin from China. Much of the remainder of Japan's rosin requirements are met with TOR imported from the U.S. And about 24,000 tons of TOR are produced annually by the country's pulp mills. The amount of rosin imports depends largely on the pricing and availability of Chinese gum rosin.

Total Japanese rosin consumption dropped from 80,000 tons in 1981 to 77,000 tons in 1982. In particular, a sharp decline in rosin use was seen in the paper industry, which has decreased its use of rosin from an all-time high of 33,000 tons to about 22,000 tons at present. The rubber emulsifier industry has also decreased its use of rosin from 22,000 tons to about 17,000 tons at present due to a decrease in synthetic rubber production. However, this area is likely to recover. Rosin consumption will begin increasing 2,000 to 3,000 tons annually in the adhesives industry due to a shift from conventional solvent-type adhesives to emulsion types, which is presently occurring. The speaker concluded by saying that he does not see any other great changes in rosin consumption, but that by 1985 annual rosin consumption in Japan will be 88,000 tons.

FIGURE 1: **Toxaphene production and its effect on alpha pinene and camphene use.**



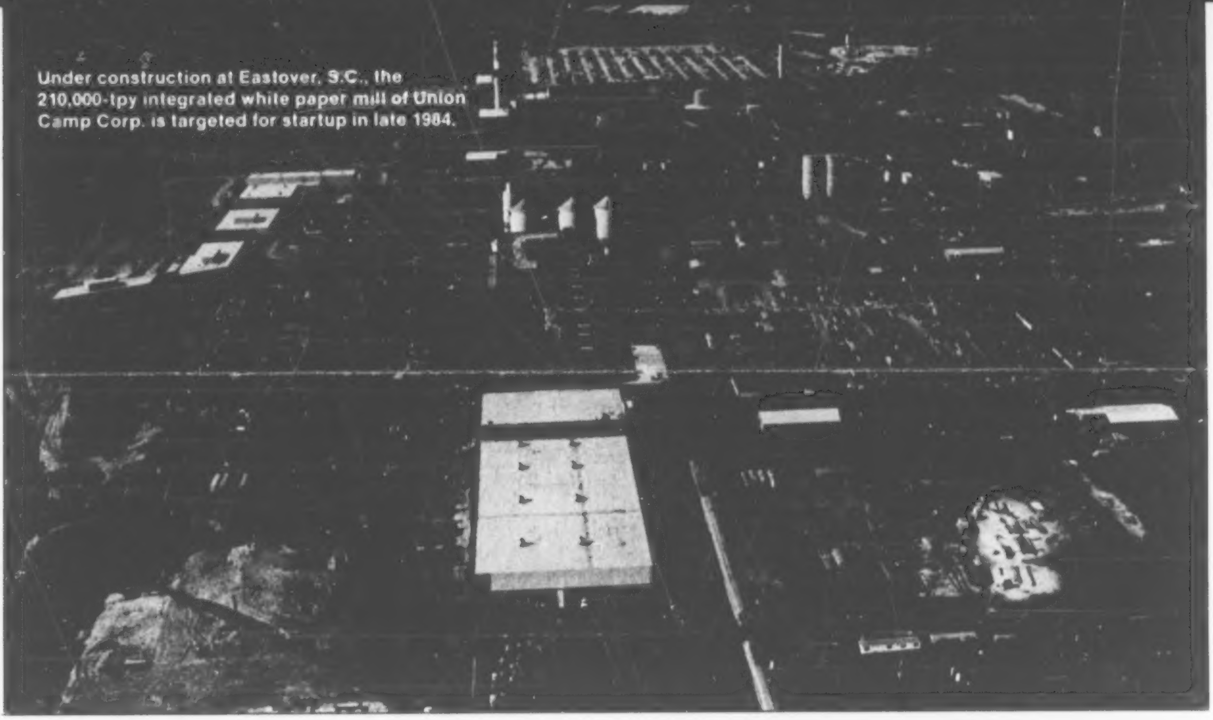
TURPENTINE, PINE OIL OUTLOOK. Maurice J. Kelley, product manager for Hercules, reported on U.S. crude sulfate turpentine production. Kelley said that sulfate turpentine production has remained relatively flat for the past 20 years at about 22 million gal/year. Production for 1983 is estimated at 21.3 million gal, and peak production occurred in 1980 when 25 million gal were produced. Gum turpentine production has decreased to about 314,000 gal/year, and wood turpentine production is now less than 2 million gal/year.

Future sulfate turpentine production is expected to remain relatively flat at about 21 million gal/year, with a slight growth rate of 1% to 2%/year. The negative effects of pulp mill use of stored chips, hardwoods, and continuous digesters has essentially leveled out, so there should be no substantial loss of production in the future.

One of the major uses for turpentine in recent years has been in the production of the insecticide Toxaphene. At its peak, the production of Toxaphene required 39.5 million lb/year of camphene and 55 million lb/year of alpha pinene gum and wood turpentine (see Figure 1). However, the Environmental Protection Agency has recently banned Toxaphene and none was produced in 1983. This has released substantial amounts of turpentine for other uses. Analysts estimate that the EPA ban reduced the total turpentine market by about 16%.

According to Donald Broome, purchasing agent for American Cyanamid Co., synthetic and steam-distilled pine oil production in the U.S. has declined to a level of 60 million lb/year. He also commented that this figure may be misleadingly high as these production figures include all grades or percents of terpene alcohol pine oils, and production has generally shifted from 80%-85% to 60% terpene alcohol pine oil in cost-cutting efforts by producers.

Almost 70% of the synthetic and steam-distilled pine oil produced in the western world is produced in the U.S., and 90% to 95% of U.S. consumption goes into household liquid cleaners and disinfectants. Broome expects the use of pine oil and pine oil liquid cleaners in the U.S. to continue to grow at a moderate rate for the next two years. But the use of pine oil for household cleaners in Latin America, the most important export market, is expected to decline, and the pine oil export business to Latin America will probably cease to exist within the next few years. With increased production coming on stream in Europe, U.S. pine oil exports to Europe may have continued difficulty competing in that market. ■



Under construction at Eastover, S.C., the 210,000-tpy integrated white paper mill of Union Camp Corp. is targeted for startup in late 1984.

CAPITAL SPENDING

1983-85 U.S./Canadian spending plans emphasize incremental expansions, better energy use

By STEPHANIE POLLITZER, Consulting Editor

REPORTED SPENDING 1983-85+, BY TYPE OF FACILITY[1]

UNITED STATES		
Wood/fiber	$ 383,034,000	6%
Pulping	1,326,246,000	20%
New machines	307,000,000	5%
Machine modifications	682,195,000	11%
Energy/power	1,768,913,000	27%
Miscallaneous/plant	1,366,149,000	21%
PRODUCTION TOTAL	$5,833,537,000	90%
Water quality	$ 251,790,000	4%
Air quality	357,240,000*	6%
Solid wate/unspecified	28,200,000	0%
ENVIRONMENTAL TOTAL	$ 637,230,000	10%
TOTAL SPENDING	$6,470,767,000	100%
CANADA		
Wood/fiber	C$ 124,343,000	3%
Pulping	1,234,857,000	36%
New machines	215,000,000	5%
Machine modifications	475,717,000	14%
Energy/power	361,630,000	11%
Miscallaneous/plant	754,699,000	19%
PRODUCTION TOTAL	C$3,166,246,000	88%
Water quality	C$ 216,100,000	6%
Air quality	189,125,000	6%
Solid wate/unspecified	5,083,000	0%
ENVIRONMENTAL TOTAL	C$ 410,308,000	12%
TOTAL SPENDING	C$3,576,554,000	100%

1. Includes projects as announced for completion in 1986 and later, as reported by *Pulp & Paper Project Report.*
2. Dollar figure includes an estimated $1,018,000,000 for projects to be completed in 1986 and later ($977,000,000 production; $41,000,000 environmental).
3. Dollar figure includes an estimated C$502,000,000 for projects to be completed in 1986 and later (C$385,000,000 production; $C117,000,000 environmental).

■ The economic realities of the recent business climate in North America are reflected in *Pulp & Paper*'s annual survey of spending plans at U.S. and Canadian pulp and paper mills. The expenditures reported to *P&P* for this 1983-85 survey total $9.7 billion, a substantial drop (28%) from the $13.5 billion listed a year ago.

Stretch-outs and indefinite postponements for projects planned have been announced by both U.S. and Canadian mills, but few announced projects have been canceled outright. New projects announced in 1983 have tended to focus on upgrading existing facilities. No new proposals for greenfield mills were made in 1983; however, plans were announced for a number of new paper and board machines in both U.S. and Canada.

U.S. spending. Officially, capital spending at U.S. pulp and paper mills in 1983 was expected to be $6.19 billion, according to a U.S. Dept. of Commerce survey conducted in July and August. This represents a 3.7% increase from the $5.97 billion spent in 1982. McGraw-Hill Economics' annual fall spending survey (issued November 1983) estimates U.S. paper industry spending in 1983 at $6.86 billion, up 14.9% over 1982. This higher estimate could reflect the midyear upturn in the economy, which has also been noted in recent mill announcements for reinstatement of postponed projects (largely for big-cost energy and power programs) and in proposals for new machines (four in the U.S. since mid-October). For 1984, McGraw-Hill forecasts an 8.4% increase in U.S. paper industry spending (to $7.44 billion) and an even larger increase of 22.1% in 1985 (to $9.80 billion).

Canadian spending. Data from the latest Statistics Canada spending survey shows pulp and paper companies expect to reduce 1983 capital expenditures to C$1.02 billion, a substantial drop from the 1982's $1.83 billion.

ABOUT THE SURVEY DATA. The tables and lists in this report are compiled from *P&P*'s annual survey of expansion/modernization programs at U.S. and Canadian mills. The dollar figures represent the total cost of the reported projects and sometimes may include supporting equipment. The total cost is assigned to the startup year—not to year(s) of expenditure.

Every effort is made to have the *P&P* annual spending survey be as complete and accurate as possible. Some companies make no public announcements of capital-investment programs, and other firms do not release financial information for announced programs. Thus it is recognized that *P&P*'s survey data is incomplete.

Information is compiled from the many companies that do report their programs in detail, and also from other information that has been publicly released. The data does not normally include spending for woodlands or for offsite converting facilities.

Assignment of cost data to the various categories (for example: pulping, or energy/power) is based on data from companies, if available. In cases where cost is not designated by the reporting companies, the figures for the various categories reflect an estimate by *P&P* staff.

Basic rules followed in assigning cost data to the categories include the following: recovery boilers are listed under "pulping" unless identified as an "environmental" project; large multimillion-dollar projects for a new machine or greenfield mill are divided into the appropriate categories, presuming a reasonable assumption of proportionate costs; "miscellaneous" includes identifiable stock preparation, coating and finishing operations as well as plant and building structure, and unidentifiable projects reported as miscellaneous.

SEVEN-YEAR CAPITAL SPENDING TRENDS

UNITED STATES

P&P's reported three-year spending ($ billion)

Year	Period	Production	Environment		Total	Annual capital expenditures[1]
			Water	Air		
1984	1983-85	$4.857[2]	$0.271[2,3]	$0.325[2,3]	$5.452[2]	$ (6.7)[4]
1983	1982-84	6.095[2]	0.376[3]	0.460	6.931[2]	6.19
1982	1981-83	6.216[2]	0.635[3]	0.677	7.528[2]	5.97
1981	1980-82	7.783[2]	0.531	0.568	8.882[2]	6.72
1980	1979-81	8.003[2]	0.515	0.360	8.001[2]	6.80
1979	1978-80	4.911	0.350	0.251	5.759[5]	5.55
1978	1977-79	4.431	0.611	0.307	5.489[5]	4.41

1. Based on data from U.S. Commerce Dept.
2. Based on *P & P* survey for 3-year period; not comparable to U.S. Commerce data since *P & P* information can include only data that has been released publicly. Please note: 1984 data does not include $1.018 billion for projects to be completed in 1986 or later ($0.977 billion production; $0.041 billion environmental); 1983 data does not include $1.292 billion for projects to be completed in 1985 or later; 1982 data does not include $2.8 billion estimated for projects to be completed in 1984-86; 1981 data does not include $1.150 billion estimated to be spent in 1983-85; 1980 data does not include $0.877 billion estimated to be spent in 1982-85.
3. 1984 data includes $0.028 billion for "solid waste/unspecified;" 1983 data includes $0.015 billion for "solid waste/unspecified;" 1982 data includes $0.050 billion for "solid waste."
4. *P & P* estimate.
5. Includes unallocated funds of $0.246 billion for 1979 and $0.140 billion for 1978 surveys.

CANADA

P&P's reported three-year spending (C$ billion)

Year	Period	Production	Environment		Total	Annual capital expenditures[1]
			Water	Air		
1984	1983-85	C$3.166	C$0.221[3]	C$0.189	C$3.577	C$ (2.0)[4]
1983	1982-84	3.990	0.295	0.272	4.557[2]	1.07
1982	1981-83	3.949[2]	0.438[3]	0.365	4.752[2]	1.83
1981	1980-82	3.645[2]	0.303	0.329	4.277[2]	2.18
1980	1979-81	2.440[2]	0.187	0.135	2.078[2]	2.11
1979	1978-80	1.462	0.110	0.113	1.685	1.55
1978	1977-79	1.442	0.166	0.112	1.720	1.26

1. Data from Statistics Canada; includes capital and repair expenditures for equipment and facilities.
2. Based on *P & P* survey for 3-year period; not comparable to Statistics Canada data since *P & P* information can include only data that has been released publicly. Please note: 1984 data does not include C$0.502 billion for projects to be completed in 1986 and later (C$0.385 billion production; C$0.117 environmental); 1983 data does not include C$0.697 billion for projects to be completed in 1985 and later; 1982 data does not include C$0.814 billion estimated for projects to be completed in 1984-86; 1981 data does not include $0.643 billion estimated to be spent in 1982-85.
3. 1984 data includes C$0.005 billion for "solid waste;" 1983 data includes C$0.002 billion, and 1982 data includes C$0.031 billion designated for "solid waste" control.
4. *P & P* estimate.

UNITED STATES

Industry targets productivity, costs; South leads in spending plans

■ Scars from the recent recessionary economy can be identified in the lowered projected expenditures of the U.S. pulp and paper industry reported in *P&P*'s 1983-85 survey. The $6.47 billion total spending for U.S. mills (the lowest since 1979) includes $1.0 billion for programs for 1986 and later. It does not include programs that have been proposed but for which no startup date has been set.

The new survey shows increased emphasis on incremental production expansions through rebuilds and modifications of existing equipment. Planned expenditures for new paper machines are down to 5% of the industry total (compared with 8% a year ago), and expenditures for paper machine modifications are 11% of the total (from 6% last year). This emphasis on machine modifications is the major shift from earlier survey reports. Percentage of total reported spending in any other category does not deviate more than 1% from last year.

THE ACTION IS IN THE SOUTH. The *P&P* 1983-85 survey reports pulp and paper spending programs of $4.2 billion for states in the South (three Census southern regions); this is 65% of the U.S. total (up from 63% last year). More than $1 billion is reported for two southern states: South Carolina ($1.226 billion) and Alabama ($1.1 billion). These two states were also Nos. 1 and 2 in the 1983 survey. Other leading southern states are Mississippi ($641 million) and Georgia ($344 million).

The second-ranking region is the Midwest (two Census regions), reporting $998 million, 15% of the U.S. total (down from 20% in the 1983 survey). Michigan leads in the Midwest ($546 million), followed by Wisconsin ($324 million).

Spending programs in the West (Mountain/Pacific

SUMMARY OF U.S. PROJECTS— REPORTED EXPENDITURES, 1983-85+[1] BY STATES (000 dollars)

STATE	PRODUCTION	ENVIRONMENTAL	TOTAL
Alabama	$1,016,058	$ 58,008	**$1,074,066**
Arkansas	25,320	2,100	**27,420**
California	29,700	—	**29,700**
Connecticut	32,623	—	**32,623**
Florida	180,750	13,800	**194,550**
Georgia	306,629	37,900	**344,429**
Idaho	8,779	—	**8,779**
Indiana	1,081	—	**1,081**
Kentucky	40,750	—	**40,750**
Louisiana	92,000	15,250	**107,250**
Maine	244,563	15,300	**239,863**
Maryland	—	2,100	**2,100**
Massachusetts	7,000	—	**7,000**
Michigan	469,600	76,800	**546,400**
Minnesota	51,847	10,822	**62,669**
Mississippi	556,100	85,000	**641,100**
Missouri	8,000	—	**8,000**
Montana	7,600	—	**7,600**
New Hampshire	45,175	—	**45,175**
New York	14,300	350	**14,650**
North Carolina	84,380	19,300	**103,680**
Ohio	51,657	3,835	**55,492**
Oklahoma	90,000	—	**90,000**
Oregon	46,639	645	**47,284**
Pennsylvania	49,622	25,600	**75,222**
South Carolina	1,093,410	133,040	**1,226,450**
Tennessee	64,500	15,500	**80,000**
Texas	154,364	26,300	**180,664**
Virginia	64,867	8,325	**73,192**
Washington	709,800	65,000	**774,800**
West Virginia	650	4,170	**4,820**
Wisconsin	305,773	18,085	**323,858**
Total	**$5,833,537**	**$637,230**	**$6,470,767[2]**

1. Includes projects, as announced, for completion in 1986 or later.
2. Dollar figure includes estimated $1,018,230,000 for projects to be completed in 1986 and after ($977,000,000 production; $41,000,000 environmental.

TOP SPENDERS IN U.S.

Companies which have reported capital spending plans of $100,000,000 or more, including both production and environmental programs

	1983-85	1982-84
Champion International	$733,380,000*	$796,780,000*
Great Northern Nekoosa	600,450,000	582,120,000
Union Camp	591,307,000	744,800,000
International Paper	540,000,000	600,000,000
Crown Zellerbach	454,000,000	420,000,000*
Scott Paper	435,200,000	431,000,000*
Abitibi/Augusta Newsprint	255,339,000	242,205,000
Weyerhaeuser	244,000,000*	603,460,000
St. Regis Corp.	222,915,000*	566,862,000
Bowater North America	148,910,000	149,670,000
Fort Howard Paper	132,000,000*	40,000,000
Hammermill Paper	130,722,000	178,648,000*
Westvaco	129,100,000	100,000,000
Pentair Industries	121,715,000*	115,271,000

*Includes programs for completion beyond 3-year period indicated.

Total cost of a multiyear project is assigned to year of startup.

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN U.S.

(over $50,000,000 at an existing mill site)

Abitibi/Augusta Newsprint, Augusta, Ga.	$256,900,000*
Alton Packaging, Jacksonville, Fla.	56,000,000
Appleton Papers, Combined Locks, Wis.	54,900,000†
Bowater Carolina, Catawba, S.C.	71,200,000
Champion International, Courtland, Ala.	127,500,000*
Chesapeake Corp., West Point, Va.	57,500,000
Container Corp., Fernandina Beach, Fla.	75,000,000
Crown Zellerbach, Camas, Wash.	425,000,000*
Fort Howard, Muskogee, Okla.	90,000,000*†
Hammermill, Selma, Ala.	127,000,000
International Paper, Bastrop, La.	64,000,000
International Paper, Georgetown, S.C.	+450,000,000
Kimberly-Clark, Coosa Pines, Ala.	74,500,000
Longview Fibre, Longview, Wash.	78,000,000
Pentair/Niagara, Niagara, Wis.	84,000,000†
St. Regis Corp., Bucksport, Maine	87,731,000†
St. Regis Corp., Lufkin, Texas	95,666,000†
Scott Paper, Mobile, Ala.	369,000,000
Westvaco, Charleston, S.C.	90,000,000
Weyerhaeuser, Longview, Wash.	192,000,000†

*Includes new paper machine (also in listing of New Machines).
†Includes programs for completion in 1986 and later.

Data in this table necessarily omits expansion programs for which cost information has not been released.

states) are reported at $868 million, 14% of the U.S. total (up substantially from last year's 9%). Most of the West's expenditures will occur in Washington ($775 million).

In the Northeast (two Census regions), most of $415 million reported will be spent in Maine ($240 million).

SPENDING BY CATEGORIES. As indicated earlier, the major change in the results reported in *P&P*'s 1983-85 survey is the enlarged emphasis on upgrades and retrofits of paper machines. The $682 million outlay for machine modifications reported in the current survey is more than double the $307 million shown for acquisition of new machines. In the preceding survey, machine modifications represented less than 80% of expenditures for new machines; in three earlier surveys (1980-82) budgets for rebuilds had averaged 54% of new machine spending.

Expenditures for energy and power facilities continue to be the largest component of the industry's modernization/expansion bill, with $1.8 billion listed for this category (27% of total spending reported).

Environmental quality programs represent 10% of total industry spending as reported in the 1983-85 survey. This is the same level (10%) as in last year's survey. Expenditures for air quality ($357 million) outrank those for water quality ($252 million) as they have done for the last four surveys. Solid waste programs represent only a modest expense for the industry ($28 million in the 1984 survey).

NEW MILLS AND MACHINES. Three greenfield mills are under construction in the U.S., two of them targeted for startup in 1984. At Eastover, S.C., the 210,000-tpy bleached pulp/white paper mill of Union Camp Corp. is scheduled to come online in September. Also due for 1984 startup is the Great Northern Nekoosa Corp./Leaf River Forest Products 350,000-tpy bleached kraft market pulp mill at New Augusta, Miss. A second market pulp mill, heading for 1986 operation, is Champion International Corp.'s 265,000-tpy hardwood kraft mill at Quinnesec, Mich. Not yet under construction but promised for 1985 startup is the 280,000-tpy kraft linerboard mill of Independent Kraft Corp., to be built at Tuscaloosa, Ala. Other greenfield mills that have been proposed but do not have an established startup date are show in the "Greenfield Mills" list.

Eight new machines came online in 1983 or will start up in 1984 at U.S. mills. Three of the 1983 starters were small units to produce fiberglass mat for roofing felt mills. Champion started up a 140,000-tpy uncoated free-sheet machine at Courtland, Ala., in July. Augusta Newsprint (an Abitibi-Price Inc./Thomson Newspapers Ltd. joint venture) brought its 226,000-tpy newsprint machine at Augusta, Ga., online in October. Due to startup in 1984 are two uncoated free-sheet machines: a 160,000-tpy unit for Crown Zellerbach, Camas, Wash.,

UNITED STATES—REPORTED CAPITAL EXPENDITURES FOR 1983-85+[1] BY REGIONS AND BY TYPE OF FACILITY ($000)

PRODUCTION-RELATED EXPENDITURES

	WOOD/FIBER		PULPING		NEW MACHINES		MACHINE MOD.		ENERGY		MISC./PLANT	
New England	$ —	0%	$ 14,200	1%	$ —	0%	$ 100,394	15%	$ 144,727	8%	$ 49,500	4%
Mid-Atlantic	—	0%	—	0%	—	0%	32,350	5%	29,500	2%	2,072	0%
East North Central	45,000	12%	264,100	20%	10,000	3%	171,638	25%	92,685	5%	244,688	18%
West North Central	—	0%	—	0%	8,000	2%	31,865	5%	13,500	1%	6,482	0%
South Atlantic	115,634	30%	295,097	22%	97,000	32%	162,183	24%	754,780	37%	405,992	30%
East South Central	207,000	54%	409,900	31%	122,000	40%	78,750	11%	538,300	30%	321,458	24%
West South Central	—	0%	15,300	1%	25,000	8%	32,168	5%	189,321	11%	99,895	7%
Mountain/Pacific	15,400	4%	327,649	25%	45,000	15%	72,307	10%	106,100	6%	236,062	17%
Total	**$ 383,034**		**$1,326,246**		**$ 307,000**		**$ 682,195**		**$1,768,913**		**$1,366,149**	

ENVIRONMENTAL QUALITY SPENDING — TOTALS:

	WATER		AIR		WASTE/UNSPEC.		PRODUCTION		ENVIRONMENT		GRAND TOTAL	
New England	$ —	0%	$ 13,800	4%	$ 1,500	5%	$ 309,361	5%	$ 15,300	2%	$ 324,661	5%
Mid-Atlantic	350	0%	25,600	7%	—	0%	63,922	1%	25,950	4%	89,872	1%
East North Central	36,375	15%	62,345	18%	—	0%	828,111	14%	98,720	16%	926,831	14%
West North Central	—	0%	7,222	2%	3,600	13%	59,847	1%	10,822	2%	70,669	1%
South Atlantic	90,340	36%	117,495	33%	10,800	38%	1,730,686	30%	218,635	34%	1,949,321	30%
East South Central	78,410	31%	74,948	21%	5,150	18%	1,677 408	29%	158,508	25%	1,835,916	29%
West South Central	10,800	4%	25,700	7%	7,150	26%	361,684	6%	43,650	7%	405,334	6%
Mountain/Pacific	35,515	14%	30,130	8%	—	0%	802,518	14%	65,645	10%	868,163	14%
Total	**$ 251,790**		**$ 357,240**		**$28,200**		**$5,833,537**		**$ 637,230**		**$6,470,767[2]**	

1. Includes projects, as announced, for completion in 1986 and later.
2. Dollar total includes estimated $1,018,000,000 for projects to be completed in 1986 and after ($977,000,000 production; $41,000,000 environmental).

Regions are as follows:
New England: Maine, Vt., N.H., Conn., R.I., Mass.
Mid-Atlantic: N.Y., N.J., Pa.
East North Central: Wis., Mich., Ill., Ind., Ohio
West North Central: N.Dak., S.Dak., Nebr., Kans., Minn., Iowa, Mo.
South Atlantic: Del., Md., W.Va., Va., N.C., S.C., Ga., Fla.
East South Central: Ky., Tenn., Miss., Ala.
West South Central: Okla., Texas, Ark., La.
Mountain/Pacific: Wash., Ore., Calif., Alaska, Idaho, Nev., Mont., Wyo., Utah, Ariz., Colo., N.Mex.

and a 215,000-tpy unit for Union Camp at Eastover, S.C.

Also targeted for a 1984 startup is a tissue machine for Fort Howard Paper Co. in Green Bay, Wis. Two additional tissue machines have been announced: one for Crown Zellerbach at South Glens Falls, N.Y., to startup in the second-half of 1985 and one for Fort Howard at Muskogee, Okla., due to come online in 1986.

THE BIG SPENDERS. Reflecting the great investment involved in building a greenfield mill, the three largest spenders reported in the P&P 1983-85 survey are the three U.S. companies engaged in new mill construction—Champion, Great Northern and Union Camp. This is the second year in a row that Champion is the leader in reported spending programs. Its $733-million budget includes the new machine at Courtland, Ala., as well as the upcoming pulp mill at Quinnesec, Mich. The Leaf River pulp mill at New Augusta, Ga., puts Great Northern in the No. 2 spot, with $600 million. And Union Camp checks in at No. 3 with $591 million, mostly for the Eastover, S.C., mill.

International Paper Co. has reported plans to spend $540 million, the bulk of this for conversion of the Georgetown, S.C., mill to bleached pulp and white paper. A new paper machine and major modification of the Camas, Wash., mill is responsible for Crown Zellerbach's No. 5 position, with $454 million (not including the five-year, over-$300-million program to expand and strengthen commercial tissue business, details of which have not been announced). And Scott Paper, in the No. 6 spot, is spending most of its reported $435 million for woodyard and power improvements at Mobile, Ala.

GREENFIELD MILLS—PROJECTS IN U.S.

UNDER CONSTRUCTION OR STARTED UP IN 1983	STARTUP
Champion International, Quinnesec, Mich. 265,000-tpy bleached hardwood kraft pulp mill	1986
GNN/Leaf River Forest Products, New Augusta, Miss. 350,000-tpy bleached kraft pulp, hardwood and softwood	1984
Union Camp Corp., Eastover, S.C. 215,000-tpy white paper mill*	1984

PROPOSED (NO DATE)

Augusta Kraft Co., Augusta, Ga.
262,500-tpy kraft linerboard mill

Boise Cascade, S.C.
Proposed pulp/paper complex, possibly start with 800-tpd bleached kraft

Carolina Forest Industries, Bennetsville, S.C.
Proposed two-machine, 1,500-tpd newsprint mill

Champion International, Halifax, N.C.
Proposed bleached pulp/paper complex

Champion International, Jasper, Texas
Studies for possible mill, unbleached or possibly bleached

Georgia Kraft, Elberton, Ga.
Site for possible 1,300-tpd linerboard mill

Grenada Paper Co., Grenada, Miss.
Proposed 215,000-tpy TMP/newsprint mill

Independent Kraft Corp., Tuscaloosa, Ala.
Proposed 280,000-tpy kraft linerboard mill; hoped for 1985 start*

Inland Container, Ontario, Calif.
Feasibility studies for recycled linerboard mill

Kimberly-Clark, southwest U.S.
Reported study for pulp mill to supply disposable-diaper pulp

Sunbelt Forest Products Corp., Boligee, Ala
Proposed 215,000-tpy newsprint mill

NEW PAPER MACHINES IN U.S.

UNDER CONSTRUCTION OR STARTED UP IN 1983	STARTUP
Abitibi/Augusta Newsprint, Augusta, Ga. 226,000-tpy, 336-in.-trim, 4,000-fpm Valmet—newsprint	1983
Bird & Son, Charleston, S.C. 18,000-tpy, 120-in.-trim, 400-fpm Sandy Hill—fiberglass mat	1983
Champion International, Courtland, Ala. 140,000-tpy, 228-in.-wire, 2,800-fpm Beloit—uncoated free sheet	1983
Crown Zellerbach, Camas, Wash. 160,000-tpy, 276-in.-trim, 2,500-fpm Beloit—uncoated free sheet	1984
Fort Howard, Green Bay, Wis. No. 10 machine, 250-tpd twin-wire—tissue	1984
Genstar Stone Products, Ennis, Texas 25,000-tpy, 165-in.-wire, Sandy Hill—fiberglass mat	1983
Tamko Asphalt Products, Joplin, Mo. 20,000-tpy, Sandy Hill unit—fiberglass mat	1983
Union Camp, Eastover, S.C. 215,000-tpy, 372-in.-wire, 3,200-fpm Voith—uncoated free sheet	1984

ANNOUNCED, WITH STARTUP DATE	DATE
Crown Zellerbach, South Glens Falls, N.Y. High-speed machine—tissue	1985
Fort Howard, Muskogee, Okla. No. 4 machine—tissue	1986
Independent Kraft, Tuscaloosa, Ala. 280,000-tpy, 256-in.-trim unit (1985?) —linerboard	1985

PROPOSED (NO DATE)

Blandin Paper, Grand Rapids, Minn.
Proposed 190,500-tpy machine—lightweight coated

Boise Cascade, International Falls, Minn.
Study for new machine on hold—uncoated free sheet

Chesapeake Corp., West Point, Va.
Proposed 318,000-tpy machine (for 1985?) —linerboard

Georgia-Pacific, Port Hudson, La.
Proposed 138,000-tpy machine—uncoated free sheet

Longview Fibre, Longview, Wash.
No. 12 paper machine—lightweight kraft

Philip Morris/Wisconsin Tissue, Menasha, Wis.
Studying feasibility of new No. 4 machine—tissue

Potlatch/Cypress Bend, McGehee, Ark.
Proposed second board machine—solid bleached board

St. Regis Corp.
Studying potential locations for new unit—lightweight coated

Southeast Paper Mfg., Dublin, Ga.
Proposed 160,000-tpy machine—recycled newsprint

Westvaco, Covington, Va.
Rumored new board machine—solid bleached board

Westvaco, Ky. or Md. mill
Reported new 150,000-tpy unit—uncoated free sheet

Weyerhaeuser, Columbus, Miss.
Addition of two machines postponed—uncoated free sheet, coated groundwood

CANADA

Emphasis on pulping, upgrades—biggest programs in eastern regions

■ Spending plans by Canadian pulp and paper mills have been seriously impacted by the weak overseas markets that prevailed in 1982 and into the first half of 1983, affecting its major export products of newsprint and market pulp. Recent price increases and reported returns to profit-making operations in mid-1983 hold out hope for a happier economic climate in 1984. Canadian spending plans reported in the current *P&P* survey total C$3.6 billion (lowest since the 1980 survey) and include $502 million for projects to be completed in 1986 and later. Actual spending in 1983, excluding repair spending, was reported by Statistics Canada at C$1.02 billion, a 42% drop from the 1982 level.

QUEBEC OUT IN FRONT. Mills in the province of Quebec report planned expenditures of C$1.4 billion, 40% of Canada's total and substantially outranking Ontario's industry for the first time in five years (since *P&P*'s 1979 survey). Interestingly, the spending plans for Quebec comprise many smaller projects at many different mills and include very few big projects. The survey lists just three programs expected to cost C$100 million or more: $131 million at Donohue Inc.'s Clermont mill; $179 million for James Maclaren Industries Inc. at Masson; and $100 million by Reed Paper Inc. at Quebec City.

Ontario, however, is not far behind its rival province, reporting planned expenditures of $1.1 billion, 31% of the Canadian total. However, more than half of Ontario's reported spending is allocated to just two major expansion projects: E.B. Eddy Forest Products Ltd. at Espanola, and Great Lakes Forest Products Ltd. at Dryden..

Most heavily impacted by the recessionary economy is western Canada. British Columbia, plagued with weak lumber and pulp and paper markets plus high costs, reports spending plans of only $255 million—whereas a year ago the expectation was $995 million.

COMPANY SPENDING PLANS. Despite the economic restraints, ten Canadian pulp and paper firms plan to spend upward of C$100 million on expansion/modernization programs in the 1983-85 period (with three of the ten including projects to be completed in 1986 and later). Leading this select group is Consolidated-Bathurst Inc., which reports programs totaling $544 million. Great Lakes Forest Products, with $384 million, is in second place; and E.B. Eddy, with $321 million, is in the third spot.

Expansion programs planned for the 1983-85 period for seven existing mill sites are reported to cost $100 million and higher. Most expensive single mill-site project is the $350 million being spent by Great Lakes at Dryden, Ont. Next in line is the $249 million for Eddy Forest Products at Espanola, Ont. The four other over-$100-million programs are for Fraser Inc. at Atholville, N.B. ($170 million); CIP Inc. at Dalhousie, N.B. ($147 million), Consolidated-Bathurst at Bathurst, N.B. ($122 million); and Reed at Quebec City ($100 million).

SPENDING BY CATEGORIES. Pulp production is of prime importance to the Canadian industry and repeatedly represents 35% or more of the planned expenditures reported in the *P&P* survey. The C$1.2 billion in the 1984 survey is 36% of the Canadian total.

The major change in the current survey is the shift

CANADA—REPORTED CAPITAL EXPENDITURES FOR 1983-85+[1] BY REGIONS AND BY TYPE OF FACILITY (C$000)

PRODUCTION-RELATED EXPENDITURES

	WOOD/FIBER		PULPING		NEW MACHINES		MACHINE MOD.		ENERGY		MISC./PLANT	
Maritimes	$ 14,280	11%	$ 368,828	30%	$ —	0%	$ 73,500	15%	$ 159,260	44%	$ 69,416	9%
Quebec	45,742	37%	370,434	30%	50,000	23%	253,389	53%	124,881	35%	302,465	40%
Ontario	57,071	46%	455,865	37%	95,000	44%	118,147	25%	51,335	14%	300,427	40%
Central	2,000	2%	12,450	1%	—	0%	14,000	3%	6,400	2%	22,920	3%
West	5,250	4%	27,280	2%	70,000	33%	16,681	4%	19,754	5%	59,471	8%
Total	**$ 124,343**		**$1,234,857**		**$ 215,000**		**$ 475,717**		**$ 361,630**		**$ 754,699**	

	ENVIRONMENTAL QUALITY SPENDING						TOTALS:					
	WATER		AIR		WASTE/UNSPEC.		PRODUCTION		ENVIRONMENT		GRAND TOTAL	
Maritimes	$ 12,300	5%	$ 18,300	10%	$ —	0%	$ 685,284	22%	$ 30,600	7%	$ 715,884	20%
Quebec	139,950	65%	122,900	65%	3,383	67%	1,146,911	36%	266,233	65%	1,423,144	40%
Ontario	34,090	16%	12,700	7%	1,700	33%	1,077,845	34%	48,490	12%	1,126,335	31%
Central	—	0%	135	0%	—	0%	57,770	2%	135	0%	57,905	2%
West	29,760	14%	35,090	18%	—	0%	198,436	6%	64,850	16%	263,286	7%
Total	**$ 216,100**		**$ 189,125**		**$ 5,083**		**$3,166,246**		**$ 410,308**		**$3,576,554**[2]	

1. Includes projects, as announced, for completion in 1986 and later.
2. Dollar total includes estimated C$502,000,000 for projects to be completed in 1986 and later ($385,000,000 production; $117,000,000 environmental).

Note: Tabulations are based on these regional divisions: "Maritimes" is New Brunswick, Newfoundland, and Nova Scotia; "Central" is Manitoba and Saskatchewan; "West" is British Columbia and Alberta; Ontario and Quebec are treated individually.

from new paper machine programs to rebuilds and modifications of existing machines. Machine modification projects, reported at $476 million, represent 14% of Canada's spending plans; a year ago this was 5% of the total. And spending for new machines has dropped to 5% from its previous 12%.

Percentage of total spending by Canadian mills for other industry categories remains within one or two points of previous surveys. Total outlays for production-related projects in the 1983-85 survey are 88% (vs 89% a year ago) and environmental projects rose to 12% (from 11% last year).

NEW MILLS AND MACHINES. No new mill started up in Canada in 1983 and none are under construction as of end-1983. Some proposed projects could still come to fruition, but the heady days when two or three new mills (or more) could be counted on to come online each year appear to be very much past history.

The Brazeau Timber Development Area in central Alberta is the locale for most of the mill proposals now being considered. The provincial government is endeavoring to develop this timberland. The most promising of the greenfield mill proposals appears to be that for a joint venture of B.C. Forest Products and Alberta Energy Co. for a softwood kraft pulp mill at Whitecourt, Alta. (This would replace the postponed TMP/newsprint mill that was to have been built by BCFP at Hurdy. Two other proposals have been made to build mills in the Brazeau area—a nearly-C$1-billion project, 15-year program at Rocky Mountain House by Northwood Forest Industries Ltd./Atco; and a modest pulp and paper mill by Makin Project of Red Deer. All await the government's decision.

The only new mill proposal in eastern Canada—the joint venture of the Quebec-owned forest agency Rexfor with papermaker F.F. Soucy Inc. for a TMP/newsprint mill at Matane, in northern Quebec—received a major setback in early 1983 when the Canadian federal government failed to provide expected financing and Soucy withdrew from the project.

LATE NEWS BREAK:

Add $1.2 billion to Canadian total

On Dec. 9, as this issue was being readied to print, Domtar Inc. announced a six-year modernization program for its Windsor, Que., and Cornwall, Ont., paper mills. At Windsor, a C$773-million project includes two new paper machines to replace four existing units and raise capacity to 318,000 metric tpy. At Cornwall, a $139-million program will center on modernizing existing machines.

At the same time, Western Forest Products Ltd. in British Columbia received approval for a limited partnership designed to raise funds for needed capital improvements at its two pulp mills—the kraft pulp mill at Squamish, B.C., and dissolving sulfite facility at Port Alice, B.C. It is expected that the required $248 million will be raised and construction on the mill modifications (halted in 1982) can be resumed early in 1984.

Unfortunately, these projects could not be included in the spending tabulations in this summary. The additional $1.2 billion brings Canada's overall proposed total spending to $4.7 billion. Most of the newly announced projects will be completed in 1986 or later.

Two new paper machines started up at Canadian mills in 1983—a 192,000-metric-tpy newsprint unit at the Iroquois Falls, Ont., mill of Abitibi, and the 80,000-

SUMMARY OF CANADIAN PROJECTS— REPORTED EXPENDITURES 1983-85[1] BY PROVINCES (C$000)

PROVINCE	PRODUCTION	ENVIRONMENTAL	TOTAL
Alberta	C$ 3,400	C$ 4,900	**C$ 8,300**
British Columbia	195,036	59,950	**254,986**
Manitoba	35,000	135	**35,135**
New Brunswick	460,334	24,300	**484,634**
Newfoundland	49,200	—	**49,200**
Nova Scotia	175,750	6,300	**182,050**
Ontario	1,077,845	48,490	**1,126,335**
Quebec	1,146,911	266,233	**1,413,144**
Saskatchewan	22,770	—	**22,770**
Total	**C$3,166,246**	**C$410,308**	**C$3,576,554[2]**

1. Includes projects, as announced, for completion in 1986 and later.
2. Dollar total includes an estimated C$502,000,000 for projects to be completed in 1986 and after (C$385,000,000 production; $117,000,000 environmental).

TOP SPENDERS IN CANADA

Companies which report capital spending plans of C$100,000,000 or more, including both production and environmental programs

	1983-85	1982-84
Consolidated-Bathurst	C$543,961,000*	C$371,569,000
Great Lakes Forest Products	383,700,000	379,500,000
E.B. Eddy Forest Products	320,900,000*	298,853,000*
Abitibi-Price	299,250,000	345,050,000
Maclaren Industries	255,271,000	104,013,000
CIP Inc.	211,100,000	209,300,000
Fraser Inc.	170,000,000	228,150,000
Domtar Inc.	166,500,000	213,610,000*
Ontario Paper	144,891,000*	345,983,000*
Reed Paper	120,000,000	120,000,000*

*Includes programs for completion beyond 3-year period indicated.

Total cost of multiyear project is assigned to year of startup.

tpy uncoated free-sheet machine at Island Paper Mills (jointly owned by MacMillan Bloedel Ltd. and Fraser) in New Westminster, B.C.

Two machine are heading for 1984 startup—a 122,000-tpy uncoated free-sheet unit for Great Lakes at Dryden, Ont., and a 36,000-tpy tissue machine for Scott Paper Ltd. at New Westminster, B.C.

One machine is scheduled to come online in 1985—a 170,000-tpy newsprint unit for Maclaren at Masson, Que. The Maclaren machine will replace two existing units and also increase mill capacity by 10,000 tpy.

Installations of several new paper machines have been indefinitely postponed from the originally announced startup date--these include newsprint machines for Abitibi at Alma, Que., Great Lakes at Dryden, Ont., and Kruger Inc. at Trois Rivières, Que. ■

GREENFIELD MILLS—PROJECTS IN CANADA

(metric tons)

PROPOSED (NO DATE)

B.C. Forest Products, Whitecourt, Alta.
Studying feasibility of softwood kraft pulp mill in joint venture with Alberta Energy Co.; project would replace planned 175,000-tpy TMP/newsprint mill

Doman Industries, Nanaimo, B.C.
Long-proposed 175,000-tpy TMP mill; end-1983, project on hold

Makin Project Ltd., Red Deer, Alta.
Long-proposed 85,000-tpy CMP/43,000-tpy printing/writing paper mill; provincial government decision on allocation of management blocks in Brazeau Timber Development has not been made

Northwood/Atco, Rocky Mtn. House, Alta.
Proposed 15-year program for 150,000-tpy kraft pulp mill, TMP mill, 175,000-tpy paper machine; later more CMP and paper machines; project dependent on provincial government decision on management blocks in Brazeau Timber area

NEW PAPER MACHINES IN CANADA

(metric tons)

UNDER CONSTRUCTION OR STARTED UP IN 1983	STARTUP
Abitibi-Price, Iroquois Falls, Ont. 192,000-tpy, 352-in.-trim, 3,500-fpm Valmet—uncoated free sheet	1983
Great Lakes Forest Products, Dryden, Ont. 122,000-tpy, 194-in.-trim, 3,500-fpm Valmet—newsprint	1984
Maclaren Industries, Masson, Que. 170,000-tpy, 300-in.-trim, 4,500-fpm Beloit—newsprint	1985
MB/Island Paper Mills, New Westminster, B.C. 80,000-tpy, 159-in.-trim, 3,000-fpm Valmet—uncoated free sheet	1983
Scott Paper, New Westminster, B.C. 36,000-tpy, 185-in.-trim, 5,000-fpm KMW—sanitary tissue	1984

PROPOSED (NO DATE)

Abitibi-Price, Alma, Que.
Proposed machine to replace two existing—newsprint

Great Lakes Forest Products, Dryden, Ont.
Possible 175,000-tpy machine—newsprint

Kruger Inc., Trois Rivières, Que.
Proposed No. 10, 172,000-tpy, 300-in. Beloit (in storage) —newsprint

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN CANADA

(over $35,000,000 at an existing mill site)

Abitibi-Price, Grand Falls, Nfld.	C$49,400,000
Abitibi-Price, Iroquois Falls, Ont.	132,100,000*
Abitibi-Price, Beaupre, Que.	87,000,000
Bowater Mersey, Liverpool, N.S.	71,000,000
CIP Inc., Dalhousie, N.B.	146,600,000
Consolidated Bathurst, Bathurst, N.B.	122,000,000
Consolidated Bathurst, Grand'Mère, Que.	41,271,000†
Consolidated Bathurst, New Richmond, Que.	36,100,000†
Consolidated Bathurst, Shawinigan, Que.	80,590,000
Consolidated Bathurst, Trois Rivières, Que.	41,500,000†
Consolidated Bathurst, Ville de la Baie, Que.	74,000,000†
Domtar, Donnacona, Que.	46,600,000
Domtar, Red Rock, Ont.	44,500,000
Eddy Forest Products, Espanola, Que.	249,000,000
Fraser Inc., Atholville, N.B.	170,000,000
Great Lakes Forest Products, Dryden, Ont.	350,000,000*
James River-Marathon, Marathon, Ont.	95,000,000
MB/Island Paper, New Westminster, B.C.	57,000,000*
Nova Scotia Forest Products, Pt. Tupper, N.S.	46,200,000
Ontario/Q.N.S. Paper, Baie Comeau, Que.	86,162,000†
Reed Paper, Quebec City, Que.	100,000,000*
Scott Maritimes, Abercrombie Point, N.S.	58,550,000
Scott Paper, New Westminster, B.C.	63,000,000*
Spruce Falls/K-C, Kapuskasing, Ont.	88,200,000
Tembec, Temiskaming, Que.	43,225,000†

*Includes new paper machine (also in listing of New Machines).
†Includes projects for completion in 1986 and later.

Data in this table necessarily omits expansion projects for which cost information has not been released.

DETAILED MILL-BY-MILL LISTINGS OF CAPITAL SPENDING PROGRAMS

Pulp & Paper's exclusive survey of capital spending programs for 1983-85 by companies and at individual mill locations in the U.S. and Canada is available as a separate booklet (and is not published in the magazine).

The listings show programs for new mills and new machines, rebuilds and modernizations, plant improvements, with specifics of equipment ordered, suppliers, and price (where reported). Separate listings show projects for environmental control.

Projects listed are those planned for 1984 and 1985 (and beyond to 1989, where available), with a recap of programs completed in 1983.

This eight-page summary is included with the booklet.

Price: $75 each
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Chlorine production and prices on the upswing

By BARRY SHOCKETT

The strong growth by the construction and automotive industries in 1983 led to a recovery in demand for polyvinyl chloride (PVC) which, in turn, sparked a sharp increase in chlorine requirements for ethylene dichloride (EDC) production. Chlorine output was up almost 7.5% at the end of September 1983, compared with the 1982 period.

U.S. statistics for chlorine (000 short tons)

	1980	1981	1982	1983e
Capacity (estimate)	14,235	14,300	14,500	12,700
Production	11,421	10,558	8,907	9,900
Imports	166	181.5	217	212
Exports	117	50.5	35	61
Apparent consumption	11,470	10,689	9,089	10,050
Pulp and paper	1,500	1,400	1,200	1,300

Sources: Bureau of Census, U.S. Dept. of Commerce; *Pulp & Paper* and industry estimates.

Canadian statistics for chlorine (000 short tons)

	1980	1981	1982	1983e
Capacity	1,641	1,652	1,680.5	1,680.5
Production	1,435	1,424	1,360	1,488
Imports	42.5	27	23.5	46
Exports	166	181.5	217	212
Apparent consumption	1,311.6	1,269.5	1,166.5	1,322
Pulp and paper	612.5	562	507	529

CHLORINE

UNITED STATES

Uses: Chlorine's major use by the pulp and paper industry is for bleaching kraft and sulfite pulps.

Demand: In 1983 the pulp and paper industry used an estimated 1.3 million tons of chlorine (13% of total demand), compared with 1.2 million tons the year before. The largest end use is for EDC production.

Sources: At least 25 companies in the U.S. produce chlorine and caustic. The major chlorine producers (in descending order of nameplate capacity) are Dow Chemical, PPG Industries, Diamond Shamrock, Olin, Occidental Chemicals, Vulcan Materials, Georgia-Pacific, Convent Chemical, and Pennwalt. Imports, all from Canada, were an estimated 212,000 tons in 1983, down about 5,000 tons from 1982.

Availability: Despite the closure of some plants over the past year or so, there is still sufficient capacity to deal with increased chlorine demand. However, the long caustic situation in 1983 reduced chlorine supply for most of the second half of the year. 1983, market to tight; 1982, market; 1981, market; 1980, market; 1979, tight to very tight; 1978, market.

Pricing: Five consecutive quarterly increases to chlorine's selling prices since September 1982 have totaled almost $100. Current posted chlorine tags vary with producer and shipping point from $145/ton to $180/ton. Pricing history: 1983, $145-$180/ton, f.o.b. works, freight equalized; 1982, $145/ton; 1981, $145/ton; 1980, $145/ton; 1979, $135-$150/ton; 1978, $135-$145/ton.

Forecast: Over the long term, pulp mill chlorine use will gradually decrease as chlorine dioxide substitution increases. However, 1984 pulp mill consumption should match the 1.4 million tons consumed in 1981 if pulp production continues to rise. By the end of August 1983, market pulp output was 6.4 million tons on an annualized basis (up 8.7% over 1982).

CANADA

Uses: Chlorine's major use by the pulp and paper industry is as a bleaching agent in kraft and sulfite pulp mills. Additional quantities are consumed in onsite hypochlorite makeup.

Demand: An estimated 529,000 tons of chlorine were required by the pulp and paper industry in 1983, an increase of 22,000 tons from 1982. The industry's share of total demand was about 37.5% in 1983 vs 56% in 1979. It had increased slightly in 1982 to 40.5% from 39% in 1981. The largest end use last year was in the production of EDC, which made up 42% of the total.

Sources: Major merchant producers include (in descending order of nameplate capacity) Dow Chemical Canada, C-I-L, Canadian Occidental Petroleum, Stamchem Div., PPG Industries, and FMC Chemicals. The four captive producers are Canso Chemical, Great Lakes Forest Products, Prince Albert Pulp (Saskatoon Chemicals), and St. Anne Chemical.

Availability: Although domestic demand was up in 1983 and the industry operating rate was over 88%, no shortages were anticipated in the immediate future. 1983, market; 1982, market; 1981, market; 1980, market; 1979, tight; 1978, tight.

Pricing: Two chlorine price hikes took place in 1983—Jan. 1 and July 1—the most recent upped list to $344.75/ton. Pricing history: 1983, $308.45-$344.75/ton, bulk, f.o.b. works; 1982, $254-$281/ton; 1981, $225-$254/ton; 1980, $195-$225/ton; 1979, $163-$195/ton; 1978, $145-$163/ton.

Forecast: No further price hikes for chlorine were slated in early 1984. Over the long term, pulp mill chlorine usage will be reduced by chlorine dioxide replacement. If pulp markets continue to increase, mill chlorine consumption could reach the 540,000-ton level in 1984. By the end of September 1983, bleached kraft output was 9.6% ahead of the comparable 1982 period.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

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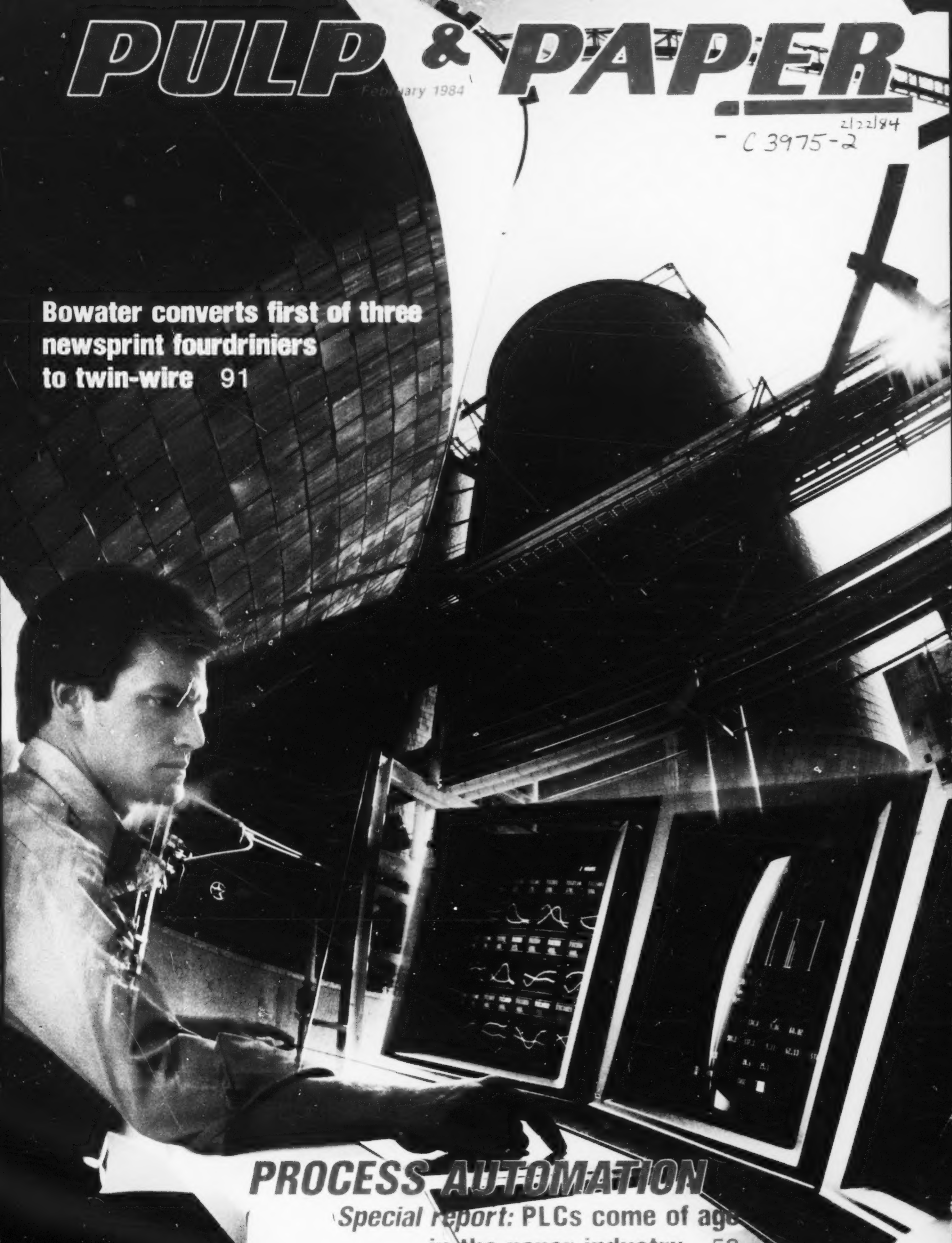

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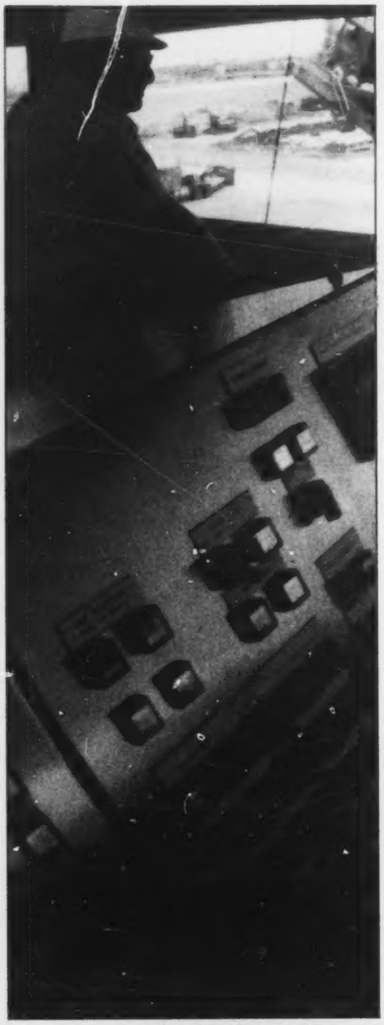

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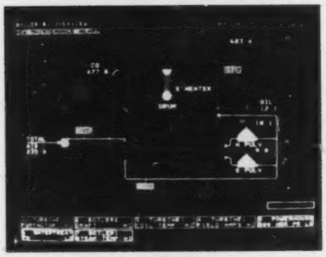

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COVER: *This issue examines one of the latest developments in process automation—the new-line PLC—and takes a look at some recent millwide and dedicated control installations. (Photo courtesy of Honeywell).*

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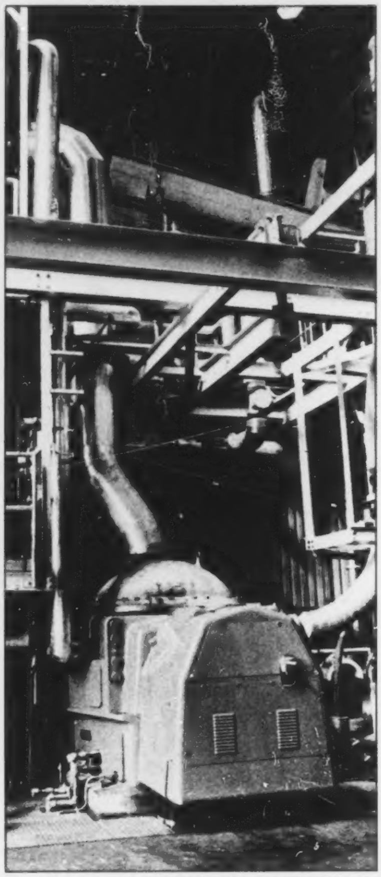

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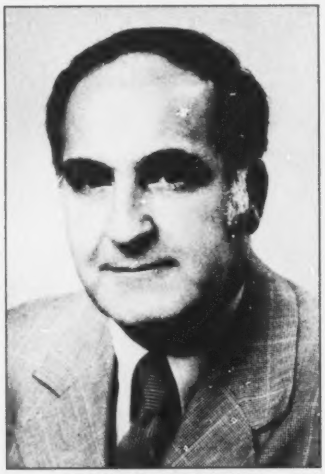

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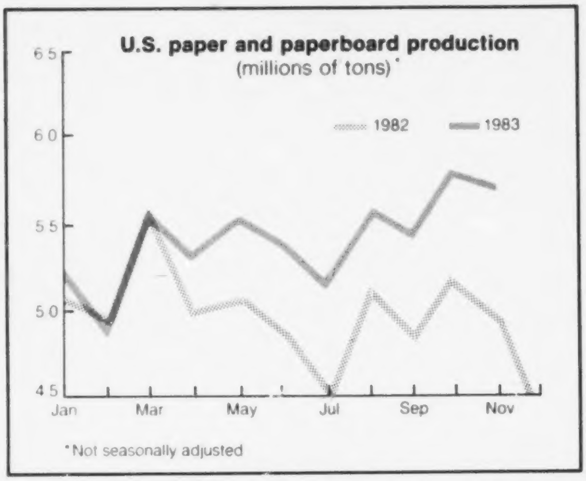
MONTH IN STATISTICS



U.S. paper and paperboard production in November totaled 5.65 million tons, an increase of 11.7% compared to November 1982, according to American Paper Institute figures. Paper and board production continued very strong for the third month in a row, with the October-November two-month moving average of seasonally adjusted data hovering around the 68-million-tpy mark.

Among major grades, printing/writing papers and tissue showed the largest increases in November. API now estimates a 14% increase in 1983 coated paper shipments over 1982 and an 11% increase for uncoated free-sheet papers. Paperboard production remained strong in November in all the major grades. 1983 containerboard production was about 10% higher than in 1982, API estimates. Corrugated box shipments through November were up 9.7% from a year earlier, according to the Fibre Box Assn.

Canadian newsprint shipments in November totaled 766,000 metric tons, up 10.7% from 1982, according to Canadian Pulp & Paper Assn. figures. Newsprint mill operating rates stood at 95%, up from 80% in November 1982.

		Latest month (000 short tons)	**% change from year ago**	**Annualized year-to-date** (000 short tons)	**% change from year ago**
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	November	453	10.2	5,142	2.3
Uncoated groundwood (s)	November	138	12.2	1,515	3.3
Coated paper (s)	November	540	25.3	5,710	12.9
Uncoated free sheet (s)	November	745	14.4	8,699	10.4
Unbleached kraft packaging and industrial (s)	November	330	0.9	3,809	2.5
Tissue	November	395	7.9	4,760	7.5
Total paper	**November**	**2,842**	**11.8**	**32,911**	**7.5**
Kraft linerboard, unbleached	November	1,331	9.1	15,154	10.5
Semichemical medium	November	423	14.0	4,747	7.2
Bleached paperboard	November	330	8.9	3,841	8.2
Recycled paperboard	November	645	18.9	7,274	10.9
Total paperboard	**November**	**2,805**	**11.7**	**32,198**	**9.2**
Total paper and paperboard*	**November**	**5,647**	**11.8**	**65,109**	**8.4**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	October	4,677	10.6	52,558	5.3
Market pulp production	October	590	27.1	6,453	11.2
Wastepaper consumption at paper/board mills	October	1,321	9.2	14,359	5.9
Pulpwood consumption (cords)	November	7,534	9.3	85,721	7.8
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	November	21.043	9.7	232.940†	7.0
Containerboard inventories at box plants	Nov. 1	2,302	−5.0		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	October	835	12.8	8,829	9.8
Imports of Canadian newsprint	October	630	n.a.	6,767†	4.0
U.S. paper exports (including products)	October	347	−7.0	4,565	5.9
Exports of unbleached kraft linerboard	November	158	9.0	2,178	11.5
Exports of woodpulp	October	315	32.9	3609	5.1
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	November	766	10.7	7,718†	5.3
Operating rates	November	95%	80%	85%	83%
Inventories held by U.S. consumers	Nov. 30	1,211	−8.5		
Woodpulp shipments (export only)	November	522	3.6	6,079†	14.5
Operating rates	November	89%	70%	84%	78%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Tissue: Strengthened demand, slow capacity growth: high operating rates

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons[1]	4,438	4,750	4,950
Capacity, 000 tons[1]	5,125	5,182	5,236
Utilization rate, %	86.6	91.7	94.5
Imports, 000 tons[2]	7	11	10
Exports, 000 tons[2]	23	16	18
Apparent U.S. consumption			
000 tons	4,422	4,745	4,942
lb/capita	38.3	40.7	42.0
000 tons/$billon real GNP	2.98	3.09	3.05

[1]API data [2]Commerce Dept. data e=estimate

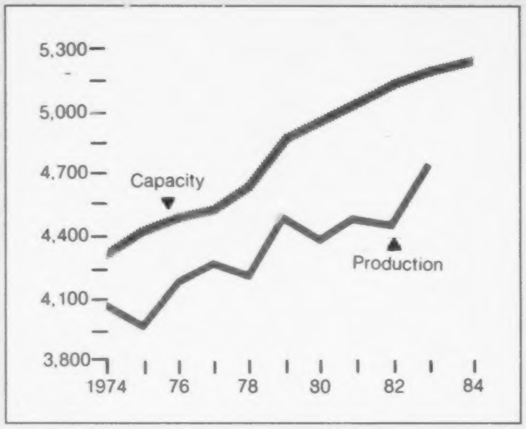
GRADE STRUCTURE: Tissue consists of two subgroupings: sanitary and "other." By far the largest group is sanitary, constituting about 97% of production. Major sanitary grades are facial tissue, bathroom tissue, toweling, napkins, and basestock for sanitary stock, wadding, and wipes. The "other" category includes basestock for waxing, wrapping, and miscellaneous tissue. Sanitary can also be divided into consumer (about 3 million tons in 1982) and commercial/industrial (about 1.4 million tons). Typical basis weights for single-ply bathroom tissue are 12 to 14 lb/3,000 ft² and for single-ply towel, 32 to 39 lb/3,000 ft².

PRODUCTION/CAPACITY: Tissue output tends to be directly related to economic activity and thus went on a roller coaster ride in the early 1980s. It dropped 2.9% in 1980 and bounced back up by 3.2% in 1981, only to fall 2.9% in 1982 and surge back up by 7.0% in 1983. Unit volume fell little if at all, however, as the market shifted to single-ply products and lower sheet-count and size. Smith Barney, Harris Upham & Co. analyst George Adler estimates case shipments overall rose by about 6% in 1982, while tonnage was off.

While production was uneven, capacity showed little growth, rising by only 5.7% between 1980 and 1984. Indeed, 25 old machines representing 278,000 tpy of capacity were shut down in the 1980-83 period. Only three new machines were scheduled for the 1984-86 period, representing an addition to industry capacity—including other improvements planned—of 363,000 tons, or a 2.3%/year growth rate.

Uneven demand levels led mills in the early 1980s to take advantage of temporarily reduced fiber costs to launch aggressive promotion (discount) drives, keeping pricing fairly stable during the period.

OUTLOOK: Output in 1983 benefited from the surge in the U.S. economy, which pushed tonnage production up an exhilerating 7%. As the recovery enters a more mature phase in 1984, growth should moderate, and tissue production is forecast to rise by just 4.2%. Still, with capacity going up only 1.0% between 1983 and 1984, operating rates should rise to a very healthy 94.5% this year. Price increases during the first quarter were considered likely. With operating rates remaining high all year long, pricing should enjoy its best year since the late 1970s. Fort Howard Paper Co. is considering two new machines in the next three years, however, in addition to a small 14,000-tpy expansion planned for 1984 by Tagsons Papers Inc., in Mechanicville, N.Y. If the U.S. economy slows down in 1985, production and hence operating rates could perform less impressively in 1985 and 1986.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. Scott Paper Co.	1,035	19.8
2. Procter & Gamble Co.	900	17.2
3. Fort Howard Paper Co.	565	10.8
4. James River Corp.	560	10.7
5. Georgia-Pacific Corp.	510	9.7
6. Kimberly-Clark Corp.	400	7.6
7. Crown Zellerbach Corp.	310	5.9
8. Potlatch Corp.	123	2.3
9. Marcal Paper Mills Inc.	115	2.2
10. APL Corp.	95	1.8
11. Wisconsin Paper Mills Inc.	91	1.7

U.S. annual capacity (1984): 5.236 million tons
Capacity share of top five companies: 68.2%
Capacity share of top ten companies: 88.1%

PRICING: Price performance trends according to the Bureau of Labor Statistics' producer price index have been as follows: (year-end; 1967=100): 1970, 115.1; 1972, 121.0; 1974, 155.7; 1975, 194.7; 1976, 214.7; 1977, 236.7; 1978, 253.3; 1979, 279.4; 1980, 343.4; 1981, 349.2; 1982, 362.6; Nov. 1983: 359.7.

MARKET: Breakdown of major tissue end uses is as follows: toilet, 38% (of which 54% is single-ply and 46% is multi-ply); towels, 31%; facial, 8%; napkins, 13%; wipes, 2%; other sanitary, 5%; nonsanitary, 3%. Nonsanitary tissue demand has fallen from 230,500 tons in 1972 to 148,400 tons in 1982.

News section continues on page 21

ENVIRONMENT

Administration woos 'average voter'

While Congress enjoyed its holiday vacation, the Administration was taking steps to defuse the potentially explosive environmental issue before it further damages the Republican Party's presidential prospects.

In replacing controversial officials like Anne Burford at the Environmental Protection Agency and Jim Watt at the Dept. of Interior, the White House has completed the first, and easiest, stage of its campaign to improve its environmental image. The second stage, now underway, is to agree upon concrete actions that will at least mollify heightened public concern over environmental protection.

The White House is reportedly struggling to resolve an internecine dispute over an acceptable acid rain policy in time for the Administration's testimony before the Senate Environment Committee on Feb. 2.

GOP strategists insist some sort of credible acid rain policy must be in place soon for President Reagan to run on during the primaries. Some White House aides, however, question whether the President can approve a position in time for the Senate hearings, noting he hasn't yet considered the complex issue at all.

OMB Director David Stockman and EPA chief William Ruckelshaus have considered it and arrived at different conclusions, with Stockman objecting that not enough is known to justify the costs of clean up and Ruckelshaus urging adoption of a moderate program now.

Meanwhile, at the Interior Dept., Secretary William Clark is presiding over a housecleaning. He reportedly will soon dismiss Watt's controversial departmental solicitor, William Coldiron, and has already asked for the resignations of Watt's chief aides responsible for coal and mineral leasing. So far, BIM Director Robert Burford has not been affected by the replacements.

Review of current programs. Former congressional liaison Stan Hulett, now working in San Francisco as Interior's western liaison, was replaced in January by Carole Hallett. Hallett is a former GOP leader of the California State Assembly and was state director of parks and recreation.

Clark told reporters the personnel moves signal neither a departure from nor a confirmation of Jim Watt's policies. The secretary has insisted that no broad policy decisions will be taken until the department completes a comprehensive review of current programs.

Clark showed a sensitivity to the public relations job he has before him in restoring Interior's credibility by replacing Watt's chief aide, undersecretary J.J. Simmons, with former EPA public affairs official Ann McLaughlin. Her first assignment: review relations with the news media.

Aiming at average voter. Environmentalists applauded the ouster of Coldiron but derided the shuffling of personnel as cosmetic. That isn't likely to bother the White House, which knows it can't please environmentalists anyway and isn't trying to. It merely wants to improve its reputation with the average voter.

That will require substantive action. Clark has already notified the OMB that he'll need an additional $100 million in fiscal 1985 to buy pockets of private land within the boundaries of national parks, and additional funds for park expansion.

Regulation of lagoons. Paper industry managers will note that EPA's draft policy reportedly urges study of more regulation of surface impoundments and treatment lagoons. The House last year passed legislation increasing regulation of treatment lagoons, but the Administration would like to minimize the regulatory burden.

EMPLOYMENT

Productivity gains consolidated

Higher production levels, workforce reductions, and other cost-cutting measures taken during the recession have given a big boost to productivity in the U.S. pulp and paper industry. Productivity per workhour at pulp, paper, and paperboard mills in September was running 10.2% higher than a year earlier, according to American Paper Institute figures.

Unit labor costs declined as increases in average wage rates lagged the rise in productivity, Bureau of Labor Statistics figures show. Production workers' wages at pulp and paper mills were up 5.5% in September from 1982, while workers in board mills were making 5.6% more.

Total employees at pulp, paper, and paperboard mills in September numbered 254,000, down 0.5% from September 1982 and down 0.2% from the number employed in June 1983. Preliminary BLS figures for October showed employment up slightly from September to 255,000 and up 1.0% from October 1982. Preliminary data for October also indicate further increases in overall paper industry employment, to 667,500 workers from 665,000 in September, as the economy continues to pick up.

Employment, hourly earnings, and productivity trends in the U.S. paper & allied products industry

	Sept. 1983	June 1983	Sept. 1982	% change Sept. 83/82
Total employees (000)				
Paper & allied	665.0	661.9	658.7	1.0%
Pulp, paper & board mills	254.0	254.5	255.3	−0.5
Converted products	411.0	407.4	404.2	1.7
Corrugated boxes	99.4	98.6	99.0	0.4
Average hourly earnings of production workers ($/hr)				
Paper & allied	$10.09	$ 9.91	$ 9.63	4.8
Pulp, paper mills	12.01	11.66	11.38	5.5
Paperboard mills	12.32	12.06	11.67	5.6
Corrugated box plants	9.03	8.97	8.76	3.1
Index of output per workhour pulp, paper, board mills*				
Production workers	125.7	117.8	114.8	9.5
All employees	124.7	116.4	113.2	10.2

*Annualized year-to-date (1980=100).
Source: Bureau of Labor Statistics, American Paper Institute.

Caution, study are keys for entering

Catalogs, heatset offset and forms look like good growth prospects for the future, but quality challenges may frustrate some new producers

By DAVID R. ALLAN, Associate Editor

■ Newsprint mills and others wanting to enter the uncoated groundwood paper business in North America or Europe will have to pick their market niche carefully if they want to earn an adequate profit. And the quality challenges of such production may be higher than many in the paper industry realize.

These were some of the conclusions of *Pulp & Paper's First Uncoated Groundwood Papers Conference*, recently held at the Waldorf-Astoria Hotel in New York, New York. About 250 papermakers, publishers, converters, merchants, equipment suppliers and others heard an array of speakers sound a note of caution about the sometimes optimistic public view of the uncoated groundwood market's future.

But several of the speakers also pointed out some exciting market opportunities for mills willing to make the investment to serve particular customer needs. Opportunities cited include the business forms and catalog markets and the heatset offset portion of the newspaper insert and preprint market.

OUTLOOK FOR MARKETS. Demand for uncoated groundwood papers stagnated during the recent back-to-back recessions, and the future for many important end uses—both in Europe and the U.S.—appears unexciting. Finnpap's Marjatta Malmipohja cited supercalendered (SC) uncoated groundwood offset paper as a growth area in Europe, however, with double-digit increases possible from the present 200,000-metric-tpy level.

A general trend toward offset—caused by growth in specialized magazines and directories—seems to be developing in Europe, but it won't always mean gains for uncoated groundwood. Some end users will decide instead to shift to coated paper in search of an adequate offset printing paper.

Most other European uncoated groundwood markets appear fairly stable, however, and capacity for virtually all end uses seems sure to equal or exceed demand for the foreseeable future.

North American mills should enjoy fairly healthy operating rates going into the mid-1980s, according to Jones Heward & Co. financial analyst Brian Topp. Canadian "supernews" mills should run at 91% next year and 94% in 1985, while their U.S. competitors may run at only 90% in 1984 but should be up to 94% the following year, he said. Topp projected an operating rate for each country of just 85% this year.

The reason why next year's rate is not expected to be higher is that North American mills will be recovering from depressed levels, but Topp expected North American newsprint and uncoated groundwood mills together will see a 6.7% demand jump next year and 5.8% the following year. He forecast a 7.2% jump for groundwood demand in 1984 and 5.4% in 1985.

Catalog paper. Lightweight catalog paper will gain a premium value in the next few years because the Postal Service will probably move to jack up mail rates for catalogs, Hanover House Industries executive vice president William Fitzgerald said. Some catalogs, including a few of Hanover House's own, have been moved down the basis weight scale already in recent years to get more pages per ounce of mailing weight. But further downgrading in weight would represent a major opportunity for uncoated groundwood mills that can offer a high-quality substitute for coated paper, Fitzgerald said.

Madison Paper Industries saw itself as a major competitor for that future growth in catalogs when it decided to add a 160,000-tpy SC machine at its Madison, Maine, mill.

TABLE 1: **North American groundwood specialties and newsprint operating rates.**

	1982	1983f	1984f	1985f
Canada	86%	85%	91%	94%
U.S.	83	85	90	94

Source: Brian Topp, Jones Heward & Co. f=forecast

TABLE 2: **Specifications for theoretical heatset offset paper compared with existing SC sheet.**

	Heatset	SC
Saturation level	5.3	5.8
Brightness	68-69	69.5
Surface smoothness	95	78
Basis weight	35 lb	35 lb
Price: Less than supercalendered		

Source: Treasure Chest Advertising suggestions.

the uncoated groundwood market

Rather than focusing primarily on the small (16 to 98-page), high-volume mail-order catalog such as those represented by Hanover House, Madison aimed its efforts at the large mail-order retailers such as Penney's, Sears and Wards, offering especially a 30-lb (3,300 ft^2 basis) sheet that was among the best uncoated catalog papers available in North America. And with its catalog customers as well as magazine, supplement, insert and commercial printing paper customers apparently liking the paper, the machine is now operating above its design capacity, Madison president Jack Chinn said.

Inserts. The insert market will grow at a compound annual rate of 8% over the next five years, Treasure Chest Advertising Inc. CEO Robert Milhous predicted. Thus it could approach 2.9 million short tpy before the end of the decade. And Milhous expected to see the offset portion to "grow at a faster rate as it continues to take market share away from the other print processes." Milhous thought it likely that "uncoated groundwoods would be the most likely beneficiary of any growth in the circular market." Especially helpful, he added, would be a grade of paper designed specifically for the heatset offset market, since he expected his current ratio of heatset to coldset printing to rise from 25% at present to over 60% in 1988.

Forms paper. Star Forms Inc. president Hunt Harris expected the total groundwood forms market to jump from 330,000 tons in 1982 to 610,000 tons in 1990—assuming mills can meet the forms industry's extremely tight quality needs—while the carbonless sector of the groundwood forms industry jumps from 130,000 tons to 245,000 tons.

Stock continuous forms will lead the industry in growth, rising at 7.5%/year between 1982 and 1986, Harris believes, while custom continuous will rise by a healthy annual rate of 6.3% and unit sets by a more mature 3.3%/year. Stock continuous will soak up the lion's share of groundwood forms paper by 1990, as they do currently, with 200,000 tons of stock continuous carbonless groundwood being produced and 350,000 tpy of other uncoated groundwood stock continuous forms.

Directories. St. Regis Corp.'s Ted Robinson estimated 1981 "directory paper" demand in North America at 644,000 tons, with 503,000 tons going into directories and the balance into catalogs. Demand from both end uses should hit 936,000 tons by 1990, he projected. Lightweight directory and catalog paper demand in the U.S. alone should rise at 2.5% to 3% over the next few years, Consolidated-Bathurst Inc.'s Ashok Narang said.

Recent paper conservation efforts by GTE Directories Corp. have put a ceiling on its 40,000-tpy consumption increases, but printing director Alan Duy noted those efforts are largely over and he expected his company's total printed page count to rise by 5% or more over the next five years. He did not think electronic directories are much of a threat during that time frame and did not expect to see any big move toward directory inserts printed on other grades of paper, four-color advertising, or use of coupons in phone books.

Rotonews. Robinson saw rotonews demand in the U.S. growing from 764,000 short tons in 1981 to just over 1.0 million tons in 1990, with the newspaper insert portion of it jumping from 260,000 tons to 411,000 tons. But roto now supplies only 27% of all insert paper and letterpress 8%, as estimated by Treasure Chest's Milhous, and will continue to lose share to offset paper.

Supercalendered. Supercalendered paper was consumed in 1981 to the tune of 299,000 tons in the U.S., according to Robinson, with this likely to grow to 521,000 tons by 1990. Madison's Chinn, talking about 1980, saw a bigger market of 375,000 tpy, with about half of that coming from Scandinavia and western Europe.

The European market for SC paper is much larger than the U.S. market, Finnpap's Malmipohja said. She estimated total SC demand in western Europe at 1.8 million metric tons out of the total 3.1-million-tpy European groundwood specialties consumption. Most of that SC demand is from gravure printers, who make up the bulk

TABLE 3: **Estimated paper tonnage shipments to the business forms industry, 1990 (000 tons).**

	Custom continuous	Stock continuous	Sets and other	Total
Forms bond	775	1,335	130	2,240
Carbonless free sheet	175	0	540	715
Carbonless groundwood	25	200	20	245
Other uncoated groundwood	0	350	15	365
Other	85	0	85	170
Total	1,060	1,885	790	3,735

Source: Hunt Harris, Star Forms Inc.

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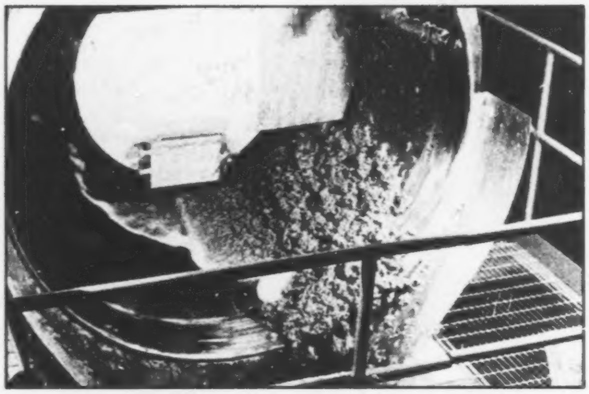

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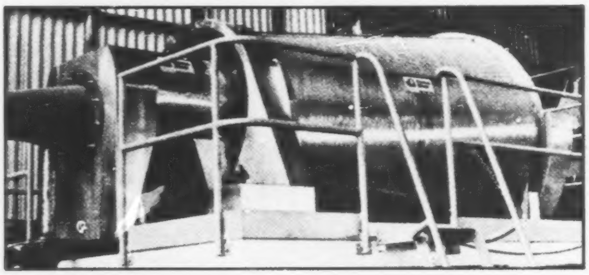

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of the big SC magazine industry in Europe, but the growth appears to be in the small 200,000 tpy SC offset, thanks to the flexibility requirements of time-sensitive publications such as *TV Times* or regional editions of publications such as the *Observer*.

UPGRADING CAPACITY. Large volumes of newsprint capacity have become uncompetitive, and some observers think a significant move of that capacity to uncoated groundwood is possible in the next few years.

Topp predicted operating profits during the peak of the currently beginning market recovery will lag operating profits in the last cyclical peak by nearly 15%, however, restraining overall capacity expansion in groundwood. He did, nevertheless, point to three MacMillan Bloedel machines—No. 9 at Powell River, B.C., and two units at the Port Alberni, B.C., mill—as possible candidates for conversion. As Great Northern Paper's Howard Willets pointed out, however, such upgrades are expensive and time-consuming projects for any company and require a serious study of market niches before being entered into with any expectation of adequate payback.

Competitive groundwood products may also be harder for new entrants to make than many realize. Abitibi-Price Inc.'s T.R. Hall cited a long list of difficult quality challenges to be met for each groundwood product.

Even employee retraining can be a difficult and time-consuming job. Hall estimated that when Abitibi converted its Beaupre, Que., mill from newsprint to groundwood specialties, it spent almost $1 million on training everybody from woodlands personnel to quality control people in the needs and problems of offset, rotogravure and letterpress printers.

And one of the fastest growing groundwood end uses—the forms market—also has some of the most difficult quality requirements, as Star Forms' Harris noted. A few firms—he specified Abitibi and Consolidated-Bathurst by name—"have invested in the cleaning and refining capacity to produce a very acceptable groundwood forms bond," Harris said. But, he added, "some other suppliers are less clean and offer a product that resembles newsprint more than the forms bond that we are used to converting."

Among the quality problems faced by converters using groundwood paper are a dirty paper surface—especially troubling for converters using flying splicers—along with questions about a sheet's ability to punch cleanly, refold properly and show a consistent caliper and basis weight.

Some mills may think that all they have to do to serve the forms, directory or catalog market is get down to a lighter basis weight. But Jaakko Pöyry International Oy's Magnus Diesen pointed out that when a mill wants to reduce basis weight of its product, a paper machine with an open draw—typical of many smaller, older Canadian newsprint machines—may be at a disadvantage when it comes to paper machine runability.

Other questions to consider in deciding whether a given machine or mill can be converted to groundwood specialties, Diesen noted, include the quality of the woodfiber, arrangement of the woodyard to allow for adequate presorting of wood, availability of a low-freeness mechanical pulp, and layout of a mill to permit installation of two or three supercalenders. Old newsprint machines may also not be up to the required winding standards of SC paper, Diesen added. ■

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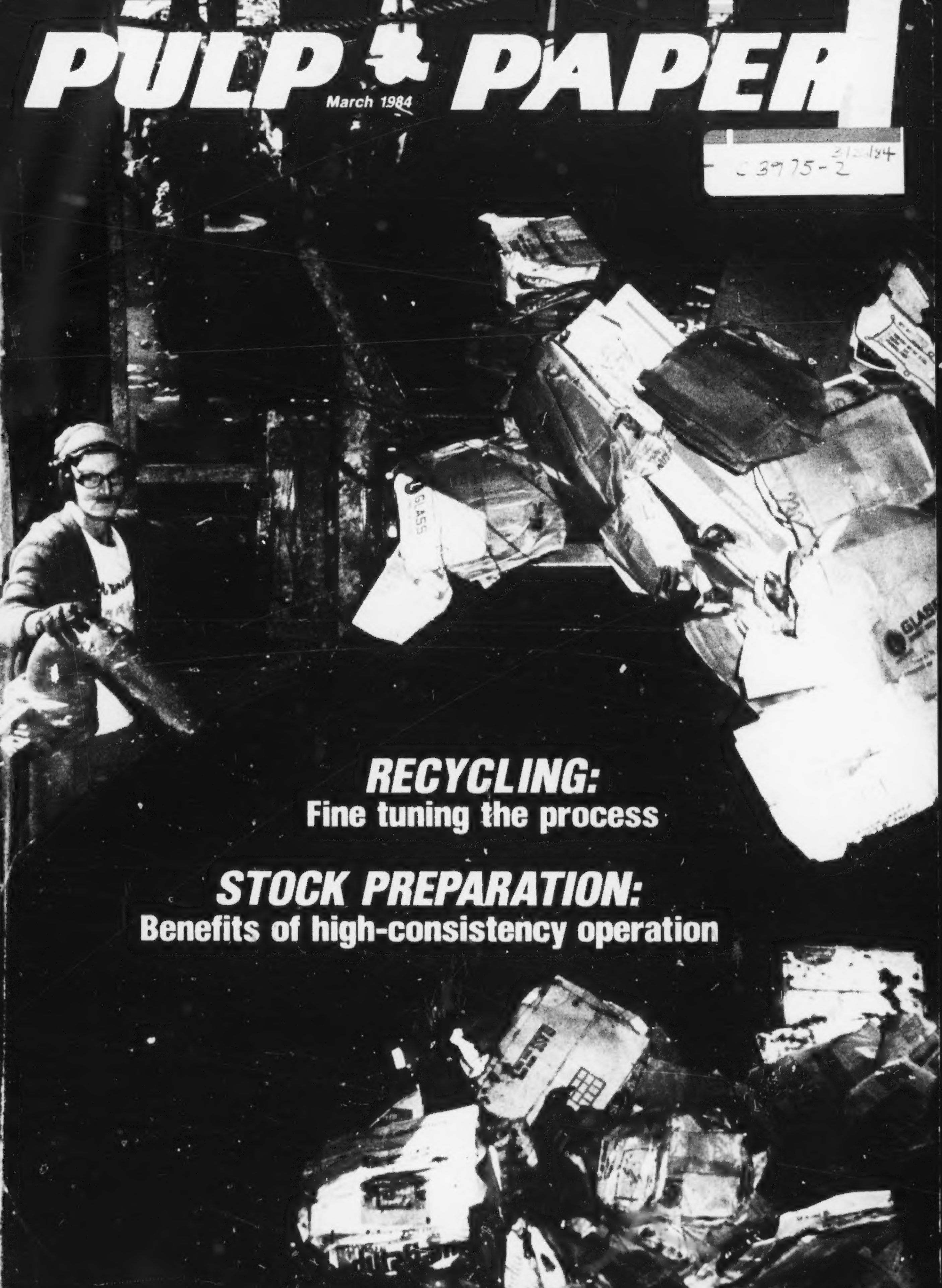

RECYCLING:
Fine tuning the process

STOCK PREPARATION:
Benefits of high-consistency operation

PULP&PAPER

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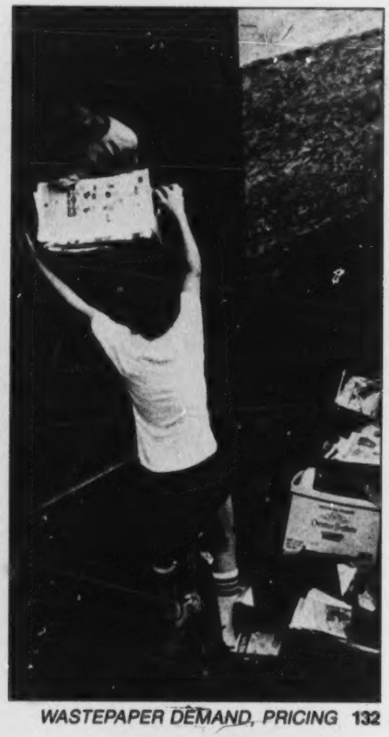

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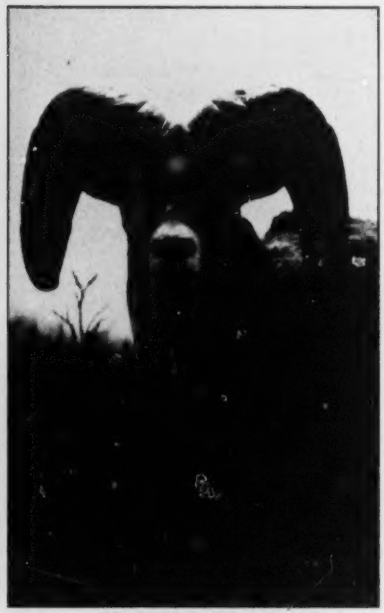
COVER: *Recent developments in recycling have focused on process refinements for improved efficiency, lower production costs. Along with recycling, this issue also highlights current trends in the stock preparation area. (Photo courtesy of Sonoco Products Co.)*

RAYONIER'S RECOVERY CONTROL 96



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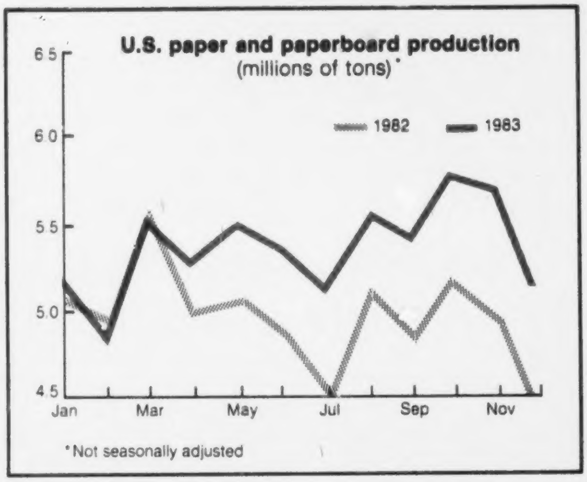
MONTH IN STATISTICS

U.S. paper and paperboard production in December totaled 5.14 million tons, establishing a new record for the month and capping what was by far the highest second-half production rate in history, according to the American Paper Institute. The December level was up 18.7% from December 1982. The fourth-quarter average of seasonally adjusted data stood at 68.0 million tpy, bringing total paper and paperboard production for 1983 to a record 64.8 million tons, up 9.0% from 1982 and up 4% from the previous record set in 1981.

Among major grades, the largest gains for the year were in the printing/writing grades, up 11% from 1982, and in tissue and miscellaneous packaging grades. Linerboard, up 23.7% in December from 1982, and recycled board, which jumped 22.4% in December, led the way among the paperboard grades. Corrugated box shipments totaled 252.9 billion ft² in 1983, setting a new record, according to the Fibre Box Assn.

Canadian newsprint shipments in December of 725,000 metric tons were down 2.6% compared to 1982, according to Canadian Pulp & Paper Assn. figures. Newsprint mill operating rates were 88% for the month, up from 71% in December 1982.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	December	424	16.8	5,176	2.7
Uncoated groundwood (s)	December	126	6.8	1,515	3.9
Coated paper (s)	December	476	19.3	5,723	13.7
Uncoated free sheet (s)	December	704	17.7	8,680	10.6
Unbleached kraft packaging and industrial (s)	December	301	11.5	3,792	2.8
Tissue	December	385	11.6	4,787	7.9
Total paper	**December**	**2,671**	**16.6**	**32,878**	**8.1**
Kraft linerboard, unbleached	December	1,132	23.7	15,007	11.2
Semichemical medium	December	384	17.1	4,731	7.8
Bleached paperboard	December	307	14.6	3,918	6.9
Recycled paperboard	December	568	22.4	7,234	11.7
Total paperboard	**December**	**2,463**	**21.0**	**31,951**	**9.9**
Total paper and paperboard*	**December**	**5,135**	**18.7**	**64,829**	**9.0**
PULP, WASTEPAPER & TIMBER[2]					
Total woodpulp production	November	4,645	10.3	52,856	5.8
Market pulp production	November	585	14.3	6,505	11.5
Wastepaper consumption at paper/board mills	November	1,260	13.7	14,428	6.7
Pulpwood consumption (cords)	November	7,267	5.5	85,856	7.7
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	December	19.960	13.8	252.900†	7.5
Containerboard inventories at box plants	Dec. 1	2,415	4.9		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	November	854	18.3	8,958	10.7
Imports of Canadian newsprint	November	622	9.9	6,831†	4.6
U.S. paper exports (including products)	November	404	31.2	4,591	7.9
Exports of unbleached kraft linerboard	December	168	23.5	2,163	12.0
Exports of woodpulp	November	252	2.0	3,556	4.8
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	December	725	−2.6	8,441†	4.6
Operating rates	December	88%	71%	85%	82%
Inventories held by U.S. consumers	Dec. 31	1,194	−5.9		
Woodpulp shipments (export only)	December	715	39.4	6,795†	16.7
Operating rates	December	85%	62%	85%	76%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Coated free-sheet papers:

Tight market seen through '84

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons[1]	2,090	2,210	2,340
Capacity, 000 tons[2]	2,274	2,402	2,487
Utilization rate, %	91.9	92.0	94.1
Imports, 000 tons	12	25	35
Exports, 000 tons	47	45	36
Apparent U.S. consumption			
000 tons	2,055	2,190	2,339
lb/capita	17.78	18.77	19.86
000 tons/$ billion real GNP (1972)	1.38	1.42	1.46

e = estimated 1. *P & P* estimates. 2. API capacity survey.

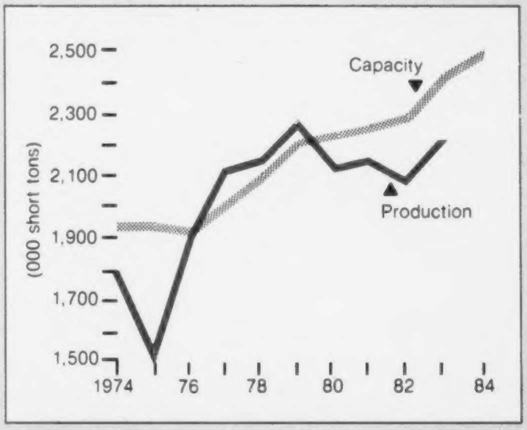
GRADE STRUCTURE: Coated free-sheet paper consists of paper made from 10% or less groundwood pulp, with the balance made up of chemical pulp. Grades included in coated free sheet include Nos. 1-3 and about 52% of No. 4 output. Some No. 3 coated includes small amounts of groundwood, but the top two grades are made from 100% chemical pulp.

Most of the Nos. 3 and 4 grades fall between 45 lb and 90 lb in basis weight. The Nos. 1 and 2 grades generally fall in the 60-lb-to-100-lb range. End uses for coated free sheet are largely in commercial printing, although as much as a fifth of No. 3 goes into books and magazines. Most of the almost 400,000 tpy of coated-one-side paper is coated free sheet. Coated paper comes in finishes that include glossy, dull, matte and embossed. Magazine paper tends to be glossy, while dull and matte are used for book and commercial printing end uses. Embossed tends to be for fancy printing jobs and makes up less than 2% of shipments in any grade.

Glossy paper is considered to have a gloss level of 45 and over on the Gardner gloss meter. The gloss level of dull falls between 25 and 35, and matte is about 0 to 20. One industry survey reportedly shows that about 65% of all coated-two-sides No. 1 is glossy and 35% is dull, with the balance in matte and embossed; for No. 2 the spread goes to 80% and 16% for glossy and dull, respectively; and for No. 3 it is about 63% glossy, 3% dull, and 33% matte.

PRODUCTION/CAPACITY: Output of coated free sheet has shown less growth in recent years than coated groundwood but did jump 5.7% in 1983 according to *Pulp & Paper* estimates (American Paper Institute does not release production figures for coated free sheet). Scott Paper Co. started up a 200,000-tpy machine at Skowhegan, Maine, in 1983, the first new unit to come online since Midtec Paper Corp. started up a groundwood/free-sheet swing machine in 1980. Capacity is expected to rise by just 5.1% between 1984 and 1986.

OUTLOOK: Markets are expected to continue strong through 1984 with the exception of a lighter than normal seasonal midyear slowdown. The economic recovery has sparked healthy demand for advertising and promotional materials, and allocations in place for most of the last year should force consumers to build inventories when current tightness lessens. Supplies will be helped as Scott's new machine approaches design speed and begins to reach the No. 3 markets it was intended for. Demand continues strong in the new super-premium papers where domestic producers have begun to compete more effectively with European imports.



Estimated 1984 capacities of major U.S. companies are:

	Annual capacity (000 tons)	**Capacity share** (%)
1. Scott Paper[1]	525	21.1
2. Westvaco	420	16.9
3. Champion International	357	14.4
4. Mead	300	12.1
5. Consolidated Papers	190	7.6
6. Potlatch[2]	150	6.0
7. Simpson Paper	123	4.9
8. Midtec Paper	100	4.0
9. Boise Cascade	54	2.2
10. Watervliet Paper	42	1.7
11. P. H. Glatfelter	40	1.6
12. Plainwell Paper	40	1.6
13. James River	35	1.4

1. S.D. Warren Div.
2. Northwest Div.

U.S. capacity (1984): 2.487 million tons
Capacity share of top five companies: 72.1%
Capacity share of top ten companies: 90.9%

PRICES: Pricing for all grades was strong in early 1984, and discounting that plagued No. 3 rollstock in late 1982 and early 1983 had not reappeared. Average prices rose by about 4.5% to 6.5% in 1983. Typical pricing trends ($/short ton) are, for 70-lb No. 1 sheets: 1978, 880; 1979, 939; 1980, 1,021; 1981, 1,096; 1982, 1,148; 1983, 1,225. For 60-lb No. 3 rolls: 1974, 574; 1975, 570; 1976, 619; 1977, 675; 1978, 698; 1979, 749; 1980, 841; 1981, 898; 1982, 928; 1983, 970.

MARKETS: The largest share of coated free sheet goes into commercial printing. More than 80% of all Nos. 1-3 is sold directly to commercial printers, for example. Major markets for No. 4 include commercial printers and book and magazine publishers, with insignificant amounts going elsewhere. More than 80% of all coated-one-side paper goes to label and wrap manufacturers.

(News section continues on page 23)

SALES & EARNINGS

U.S. paper industry turns around in 1983

On the strength of improved prices and continued high volumes for most grades, U.S. pulp and paper companies put the recession behind them in the fourth quarter of 1983, posting profits of $404.8 million—a six-fold increase over the dismal 1982 fourth quarter, according to a *P&P* survey of 22 companies. Earnings also improved compared to the third quarter, rising 20.6%. Sales of $8.1 billion were up 15.7% from the 1982 quarter and 7.1% from the third quarter. For the year as a whole, net income totaled $1.3 billion, a gain of 40.4% over 1982, on sales of $29.8 billion, up 9.2% from the previous year.

U.S. forest products companies reported a ten-fold increase in net income for the fourth quarter compared to depressed year-earlier results, according to the financial reports of seven companies. For the year, forest products companies improved their earnings by 89.5% compared to 1982—a gain which might have been even higher if prices for building products had not plummeted last fall.

'Milestone' for IP. International Paper Co. reported net income for the year of $254.9 million, up 58.5% from depressed levels in 1982, but 1983 earnings included pretax gains of $123.7 million from the sale of land and timber. Fourth-quarter net income of $68.7 million was up 152.6% from the year-earlier quarter. "The fourth quarter of 1983 was an important milestone for the paper industry and for International Paper Co.," said Edwin A. Gee, chairman and CEO. "The industry has benefited from the improving economy and higher capacity utilization rates."

Crown Zellerbach Corp.'s net income of $87.8 million for the year was up almost six-fold from 1982. "We're starting the new year with very positive feelings," said William T. Creson, chairman, president and CEO. "In 1982, we were primarily concerned with repositioning the company. In 1983, we began meeting our expectations and setting the stage for a much-improved 1984." St. Regis Corp. reported fourth-quarter earnings of $13.1 million against a loss of $49.1 million in the year-earlier quarter. "The fourth quarter was the first time this year that all of our business segments were in the black," commented William R. Haselton, chairman and CEO. "The volume growth we saw in our paper products in the second half of the year, coupled with price increases in our major lines, resulted in appreciable improvement in net sales and profits from operations." For the year, St. Regis earned $55.2 million, a gain of 22.5% over the year before. Sales were up 8.6% to $2.8 billion.

White paper led the recovery for Mead Corp., according to Burnell R. Roberts, chairman and CEO. For the year, the company posted a gain of $30 million, up from a loss of $61.7 million in 1982. Union Camp Corp. announced profits for the year of $132.7 million, up 7.0% over 1982.

Among tissue producers, Scott Paper Co. announced 1983 earnings of $123.7 million, up 66.1% from the year before. Fort Howard Paper Co. reported record sales and earnings for the year, with net income of $107.0 million up 15.8% from 1982. Kimberly-Clark Corp.'s earnings for the year totaled $188.8 million, down 4.4% from 1982.

Big gains for wood products. All of the forest products companies surveyed reported earnings up from depressed year-earlier levels. Georgia-Pacific Corp. announced earnings of $105 million for the year, up 101.9% from 1982.

Weyerhaeuser Co. posted net income of $204.8 million for the year, a rise of 21.3%. Champion International Corp.'s 1983 earnings were $82.2 million, an increase of 107.2% over 1982. Boise Cascade Corp.'s 1983 earnings amounted to $60.4 million, a seven-fold increase over 1982.

U.S. PAPER/FOREST PRODUCTS RESULTS

	Full year ($000)			
Paper companies	**Sales**	**Change 1983/82**	**Earnings[1]**	**Change 1983/82**
Chesapeake	$273,735	14.1%	$8,470	4.6%
Consolidated	573,346	8.1	48,975	8.8
Crown Zellerbach	2,708,600	−8.1[2]	87,800	585.9[2]
Federal Paper	568,999	11.6	12,458	−22.5
Fort Howard	785,976	46.4	106,980	15.8
Glatfelter	257,091	3.9	20,583	3.5
GN Nekoosa	1,565,000	9.5	84,000	7.0
Hammermill	1,622,695	16.2	32,548	7.6
Intl. Paper	4,357,100	8.5	254,900	58.5[4]
James River (10/23)[5]				
Kimberly-Clark	3,274,300	11.1	188,800	−4.4[6]
Longview (10/31)[5]	373,391	0.5	17,321	386.7
Mead	2,366,600	11.2	30,000	n.m.[3]
Pentair	319,289	17.8	11,916	13.4
St. Regis	2,774,578	8.6	55,181	22.5
Scott	2,465,088	7.5	123,679	66.1
Sonoco	668,628	24.1[7]	33,534	17.3
SW Forest	636,415	19.2	(29,821)	n.m.
Union Camp	1,688,254	17.6[7]	132,736	7.0
Wausau (11/30)[5]				
Westvaco (10/31)[5]	1,493,412	3.0	62,789	−0.5
Willamette	1,045,669	12.6	18,197	240.4
Total	**29,818,184**	**9.2**	**1,301,046**	**40.4**
Forest products				
Boise Cascade	$3,450,890	18.5%	$60,380	732.8%
Champion Intl.	4,263,999	14.1	82,160	107.2
Georgia-Pacific	6,469,000	19.8	105,000	101.9
Louis.-Pacific	1,101,980	26.3	23,120	n.m.[3]
Pope & Talbot	287,684	11.6	10,887	151.6
Potlatch	906,745	10.6	40,467	79.6
Weyerhaeuser	4,882,629	16.6	204,843	21.3
Total	**21,362,927**	**17.5**	**526,857**	**89.5**
U.S. total	**51,181,111**	**12.5**	**1,827,903**	**51.7**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. 1982 sales include CZ Canada interest sold effective Dec. 31, 1982. Earnings do not include net after-tax charge of $125 million from CZ Canada sale and restructuring of domestic operations.
3. Not meaningful due to loss in 1982.
4. 1982 income includes pretax gain of $26.7 million from sale of tax benefits. 1983 income includes pretax gains of $60.2 million from land sale and $63.5 million from sale of timber.
5. Period ended. James River figures are second quarter; Wausau first.
6. 1982 earnings include $13.9-million gain from exchange of securities and $8.3-million gain from woodlands sale.
7. 1982 figures restated by company.

( ) = loss. n.m. = not meaningful.

LABOR

B.C. industry idled by lockout

Twenty of British Columbia's pulp and paper mills were closed down Feb. 2 as the industry implemented a lockout of its two pulp and paper unions. The previous week, the industry's bargaining agent—the Pulp & Paper Industrial Relations Bureau—had indicated it would lock out the Canadian Paperworkers Union and the Pulp & Paper Workers of Canada if they didn't agree to resume negotiations soon.

Monday, Jan. 30, the PPIRB gave the required 72 hours lockout notice. Later that day, the PPWC said it was willing to return to the bargaining table on Feb. 15, but the PPIRB indicated the date was too far in the future. Earlier in January the CPU said it would set a meeting for the resumption of talks when its delegates met on Feb. 13.

As the mills completed their shutdowns, the PPIRB indicated it was still willing to negotiate even while the mills were idle.

Negotiations have dragged on more than nine months, and the industry feels the unions are stalling to enable West Coast talks to coincide with the start of eastern Canadian bargaining this spring. The two sides have not met since before the two pulp unions rejected the industry's proposal in December. The International Woodworkers of America subsequently ratified an upgraded version of that three-year package by 68.1% (*P&P*, Feb., p. 29).

As the lockout continued later in February, sawmills and related operations throughout the province were idled, observers reported.

Although Canadian Paperworkers Union and Pulp & Paper Workers of Canada members have not resorted to picketing of secondary operations, related facilities have been idled for other reasons.

Workers at sawmills adjacent to mill sites have refused to cross picket lines in some cases, and elsewhere operations have closed as chip demand has disappeared. Tugboat operators in the province also are affected, and further curtailments are expected if the lockout continues, observers feel.

One analyst estimates that a shutdown of more than two weeks will firm pulp prices and a longer curtailment will send prices soaring. Little if any pulp or newsprint is being shipped, as most firms' warehouses are at mills, observers say.

The unions, however, appeared amenable to a settlement, and the lockout could end fairly soon if talks progress as expected. CPU wage delegates were meeting Feb. 13. The following day, CPU and PPWC negotiators were to convene to decide their course of action. The two unions are "cooperating," and further talks could be held jointly, said Art Gruntman, CPU West Coast vice president.

Gruntman said he will recommend the unions return to the bargaining table even while the lockout continues. Several of the CPU's locals, however, have refused to continue talks "until the locks are lifted," said Gruntman. "But I don't think that sentiment will prevail. At least I hope not," he added.

British Columbia produces 50% of Canada's market pulp and 14% of world supply, according to Brian McClay, manager of the woodpulp section of the Canadian Pulp & Paper Assn. An estimated 13,000 short tpd of market pulp and 6,300 tpd of newsprint have been taken off the market as a result of the lockout, a *Pulp & Paper Week* tabulation shows.

The 20 mills in the province that are idled by the lockout are all PPIRB members. Another four mills in British Columbia, which are not PPIRB members, continue to operate.

CPU sets eastern bargaining priorities

Canadian Paperworkers Union delegates voted last month to make job security the top priority and to seek a one-year term for new labor agreements negotiated in eastern Canada this year, the union indicated. The one-year term is meant to allow contracts in both eastern and western Canada to expire in the same year, said CPU president James Buchanan.

In British Columbia, where negotiations have dragged on for the past nine months, the CPU seeks a two-year contract expiring in 1985. Labor agreements in eastern Canada expire this Apr. 30.

At the recent CPU wage conference, which was held to determine bargaining goals

(Continued on p. 27)

British Columbia mills affected by lockout

Company	Mill	Capacity[1]	Union
BCFP	Crofton	925 pulp[2] 1,390 newsprint	CPU, PPWC
	Mackenzie	545 pulp	CPU
BC Timber	Castlegar	590 pulp	PPWC
	Prince Rupert	1,200 pulp	PPWC
Canadian Forest	Port Mellon	525 pulp	CPU
Cariboo	Quesnel	750 pulp	CPU
Crestbrook	Cranbrook	475 pulp	PPWC
Crown Forest	Campbell River	590 pulp[1] 1,325 newsprint	CPU
Eurocan	Kitimat	145 pulp[1] 770 linerboard	CPU
Finlay	Mackenzie	450 pulp	CPU
Intercontinental	Prince George	645 pulp	CPU, PPWC
Mac. Bloedel	Nanaimo	800 pulp	PPWC
	Port Alberni	205 pulp 1,110 newsprint	CPU
	Powell River	550 pulp 2,490 gwd. spec. and newsprint	CPU
Northwood	Prince George	1,050 pulp	CPU, PPWC
Prince George	Prince George	810 pulp	CPU, PPWC
Tahsis	Gold River	700 pulp	PPWC
Western Forest	Port Alice	450 pulp	CPU
	Squamish	460 pulp	PPWC
Weyerhaeuser	Kamloops	1,200 pulp	PPWC

Mills not locked out

Belkin Packaging	Burnaby	550 recyc. board	CPU
Island Paper	New Westminster	110 fine papers	CPU
Quesnel River	Quesnel	500 pulp	non-union
Scott	New Westminster	160 tissue	CPU

1. Short tpd. 2. Market pulp only.
CPU=Canadian Paperworkers Union. PPWC=Pulp & Paper Workers of Canada

RECYCLING

Wastepaper stages sharp recovery: prices are strong, demand stable

Analysts see demand for paper stock keeping pace with production; secondary fiber consumption will rise; OCC could be in short supply

By DEBRA A. ADAMS, News Editor

■ Wastepaper appears poised for a profound recovery in 1984 and beyond, according to most market observers. Prices should continue rising for some grades and remain strong for others. Demand will be relatively stable and firm, with possible shortages later in the year if export markets continue to improve.

Secondary fiber collection will have to increase about 5% this year compared with last year to keep up with spiraling demand, according to J. Rodney Edwards, the American Paper Institute's vice president of paperboard. A record 20 million short tons of paper stock will be turned into paper and paperboard in 1984, he estimates.

And for the rest of the 1980s, U.S. paper stock demand will show strong growth, according to a study by Data Resources Inc. A projected sharp rise in export shipments will put additional pressure on domestic supplies, driving up secondary fiber prices. DRI projects that over the next decade exports will rise 75% above their most recent peak in 1980.

Canadian wastepaper usage is expected to rise to 1.3 million tons in 1983 compared with 1.26 million tons in 1982, according to one market observer.

Domestic demand for paper stock should keep pace with the growth rate of paper and board production over the next 11 years, which DRI expects to rise 37% by 1993. Secondary fiber demand will go up 40% to 20.7 million tons.

Waste Paper—the Future of a Resource, 1980-2000, a study by Franklin Associates Ltd., projects wastepaper will comprise approximately 23.7% of the raw materials used to produce an estimated 108.9 million tons of paper and board in the U.S by 2000, compared with 22.8% of the fiber furnish used to make 66.1 million tons in 1980. In the same period, woodpulp as a percentage of fiber furnish will drop to 75.3% from 76%, and use of other fibers will remain at about 1%, the Franklin study notes.

MORE SECONDARY FIBER. More secondary fiber and proportionally less virgin pulp will be used in the next 20 years as a result of worldwide pulp capacity not keeping pace with demand, according to the Franklin report. Virgin fiber shortages have led mills overseas to build deinking facilities and use more paper stock. This trend is likely to continue, drawing more secondary fiber from the U.S. market, the study indicates.

Edwards expects the export market for paper stock will rise in 1984 by 2% to 5% over 1983's projected record of 2.6 million tons. The DRI report also projects a recovery in export markets beginning in 1984 through

TABLE 1: **U.S. wastepaper prices by region ($/short ton, f.o.b. seller's dock).**

Grade	New York City	Chicago	Atlanta	San Francisco/ Los Angeles
Mixed paper (1)	$15-20	$15-20	$20-25	$30-35
Boxboard cuttings (4)	34-45	45-50	45	45
News (6)	40-45	50-55	45-50	50-60
Corrugated containers (11)	45-50	60	60	75-85
New double-lined kraft corrugated clippings (13)	70	75-80	80	90-110
White news blanks (24)	120-125	130-135	115-130	130
Hard white shavings (30)	210-215	210-220	210	195
Hard white envelope cuttings (31)	240-245	260-270	235	230
Manifold colored ledger (39)	105-120	100-110	80-100	65
Manifold white ledger (41)	130-135	120-130	94-130	120
Computer printout (42)	170-175	160	155	190
Coated book stock (43)	45-50	45-50	45-50	40

Numbers after each grade correspond to definitions in the current Paper Stock Institute of America *Standards & Practices Circular* (PS-83). These are paper and board mill purchase prices, f.o.b. seller's dock, exclusive of delivery charges and represent contract rather than spot or premium sales. Prices quoted may not reflect actual transactions, but represent estimates of current market conditions as obtained from representative sources.

1986 but a decline in 1987. During the next decade, paper stock exports are expected to grow an average of 6% a year and by 1993 reach 4.6 million tons, 75% above the last peak in 1980.

The Franklin report estimates wastepaper exports will rise to 4.45 million tons by 2000, from 2.644 tons in 1980. The U.S. will remain the major source of secondary fiber for most of the world, the study notes.

Earlier this year, export activity was having a substantial impact on pulp substitute markets. Demand began to rise steadily late in 1983 as virgin pulp prices started to firm.

In the Midwest in January, hard white envelope cuttings prices rose as much as $20 to $270, and white news blanks were up $10 to $130-$135. Some observers felt pulp subs prices might go up in February, particularly in the coastal regions where interest from overseas buyers was on the rise.

High-grade deinking prices were also firm in January in many areas of the country. In the Midwest, lightly printed bleached sulfate prices were up $10 in January, and some mills increased manifold white and colored ledger prices by $5.

One small northeastern mill increased ledger prices by $5 in January, but market observers were still uncertain if other mills would support the hike. Some of the strength in the high-grade deinking market was still due to a lack of supply rather than substantially improved demand.

HIGH GRADES RECOVER LAST. Pulp subs and other high grades have been the last to recover from two years of depressed demand and low prices. The recovery in the wastepaper market began with the low grades nearly a year ago.

Last spring saw a panic in the market, with mills scurrying to restock their old newspaper and old corrugated container inventories in anticipation of improved business activity. But by January those markets appeared to be weakening somewhat. Some attributed the decline to a market correction, considering how high some prices had shot up since last spring.

In the Southeast, OCC dropped $5 to $55-$60/ton in January, but it was expected to level off at that price for some time. The deterioration in the OCC market also caused mixed papers to go down $5 to $20-$25, and new double-lined kraft corrugated cutting prices were also weakening.

In the Northeast and Midwest, OCC prices were expected to drop $5 last December but instead remained steady through January, and no change was anticipated in February. In fact, some felt prices could go up in February if export demand continued to improve.

On the West Coast, overseas demand for OCC rose sharply in the first few weeks of the year. Export prices were up $5 in January, and some observers expected they might rise again another $5 in February. Domestic mills also appeared to be on the verge of increasing prices $5-$10.

News export prices were also up in January—$10 on the West Coast. Prices for over-

Newspaper is offloaded from pickup truck to trailer, which will take it to a nearby recycling center.

TABLE 2: **Growth in apparent available supply, 1982 to 1993, (compound growth rate).**

	Northeast	**North Central**	**West**	**South**	**Total U.S.**
News	2.2	2.5	3.6	3.7	3.1
Container	1.8	1.5	3.0	2.8	2.3
Mixed	1.5	1.2	2.8	2.7	2.1
Pulp substitutes	2.4	2.4	3.4	3.6	3.0
Deinking	3.0	2.2	3.7	3.6	3.2
Total	1.9	1.7	3.1	3.0	2.5

Source: Data Resources Inc.

TABLE 3: **Waste corrugated demand summary.**

	1974	**1982**	**1993**
Demand for paper and board (000 short tons)	5,853	6,697	9,526
Demand by grade (%)			
In newsprint	0	0	0
In printing and writing	0	0	0
In tissue	2	2	2
In packaging and other paper	1	2	2
In kraft board	7	16	24
In semichemical board	13	18	22
In recycled board	72	57	44
In building paper and board	5	5	6
Export demand (000 short tons)	552	887	1,999
Export by country (%)			
To Canada	13	0	9
To Mexico	16	10	11
To Korea	10	17	23
To Italy	5	18	4
To Taiwan	6	6	20
To Venezuela	8	12	9
To Japan	21	7	5
To Other	21	20	20
Imports (000 short tons)	13	11	12
Total wastepaper recovered (000 short tons)	6,392	7,573	11,514

Source: Data Resources Inc.

Newspaper moves up twin conveyors toward pulpers at Garden State Paper's mill in, Garfield, N.J.

seas buyers were expected to remain stable in February, but domestic mills seemed to be gearing for a price increase of $5 in February if export demand remained strong and wastepaper collections did not pick up significantly in the interim, said some observers.

OCC and old news are the primary export items in the secondary fiber market, and studies indicate they will retain that position.

OCC TO MAINTAIN LEAD. OCC is expected to remain the largest volume grade of secondary fiber consumed, increasing to 13.5 million tons in the year 2000 from 6.9 million tons in 1980. Paperboard mills, however, will be reducing their consumption until 1990 and then gradually increasing their orders, but will only reach the 1970 level by 2000, according to the Franklin report.

Old news demand will rise to 4.4 million tons from 2.6 million tons. Orders for pulp substitutes and deinking grades will not increase as rapidly, according to the Franklin study. Old news consumption will be boosted by an increase in the number of deinking mills. The percentage of old news used in domestic production is forecast to rise to 25% in 2000 from 19.2% in 1980, Franklin Associates forecasts.

In 1973, three mills using 100% old newspapers in their furnish produced 312,000 tons of newsprint. In 1982, five mills using 100% old newspapers made 723,000 tons, and four mills using 25% or more old newspapers made 900,000 tons, according to Great Eastern Packing & Paper Stock Corp.

Demand for old newspapers should rise along with the increase in consumption of newsprint. Allowing for a 2.5% average annual real growth in the economy, consumption should rise to 13.4 million tons by 1990, an increase of 19.3%, Great Eastern indicated.

Consumption of pulp subs and high-grade deinking will not rise as much as the lower grades, the Franklin forecast indicates. Those levels will rise only slightly over the next two decades. The lower

TABLE 4: **Estimated growth rates and percentage changes in U.S. wastepaper exports to major export markets.**[1]

Country	Best estimate	Jan.-Nov. 1983[2] exports (short tons)
Korea	3 yr-10%, 3 yr-5%, 2 yr-3%	511,163
Taiwan	3 yr-5%, 3 yr-2%, 2 yr-flat	495,313
Japan: 1985	(−) 10%	229,427
1990	(−) 10%	
Canada	1 yr-3%, 4 yr-flat, 5 yr-1%	317,296
Mexico	3 yr-6%, 3 yr-4%, 2 yr-2%	440,399
Italy: 1985	(+) 10%	50,887
1990	(+) 20%	
Venezuela: 1985	(−) 10%	90,819
1990	(−) 20%	

1. Growth rates and percent changes are with respect to 1980 export levels. Growth rates are shown for 8-year periods for all nations except Canada because it was assumed that the export levels of 1980 would return in 1982 following an off year in 1981. Canada did not experience the large decrease in 1981, therefore 10 years of growth from 1980 was calculated.
2. Source: National Assn. of Recycling Industries from Dept. of Commerce.

Source: Franklin Associates Ltd.

TABLE 5: **Total U.S. wastepaper recovery by grade of wastepaper, 1970 to 2000 (000 short tons).**

		Grade of wastepaper recovered				
Year	Total wastepaper recovered[1]	Mixed	News	Corrugated	Pulp substitutes	High-grade deinking[2]
1970	12,562	2,749	2,445	4,235	2,282	851
1971	12,899	2,887	2,405	4,441	2,275	891
1972	13,699	3,170	2,557	4,876	2,243	852
1973	15,189	3,426	2,903	5,551	2,363	946
1974	15,689	3,431	2,854	6,212	2,298	892
1975	13,072	2,822	2,416	5,083	1,949	803
1976	15,419	3,140	2,821	6,132	2,393	934
1977	16,348	3,173	3,081	6,827	2,330	944
1978	16,791	3,148	2,862	7,291	2,332	1,158
1979	18,025	3,241	3,160	7,916	2,458	1,250
1980	18,051	2,862	3,359	8,062	2,450	1,318
1985	20,735	3,230	3,775	9,520	2,620	1,590
1990	23,960	3,505	4,350	11,305	2,835	1,965
2000	30,590	4,020	5,465	15,370	3,220	2,515

1. Total wastepaper recovered is the sum of wastepaper use in the paper industry, other uses, and exports less imports.
2. Pulp substitutes and high-grade deinking prior to 1976 were allocated by FAL on the basis of 1976 data; prior to that API data combined the two categories.

Source: Franklin Associates Ltd.

grades will benefit from technical improvements in wastepaper pulping during the next decade. This will allow mills to use more lower quality secondary fiber, and make it more economical to substitute wastepaper for woodpulp.

Moreover, growth in the lumber industry is expected to be only slight—even flat—due to reduced housing activity anticipated for the next two decades. This will lower the amount of wood residues available for pulping and put additional strains on recyclable paper supplies, according to the Franklin study.

The share of wastepaper in the furnish of most grades will continue to rise over the next 11 years, with the most notable increases taking place in newsprint, tissue, semichemical board and building boards, according to the DRI study.

In the Canadian market, the sanitary paper industry appears to hold the most promise for wastepaper recyclers. That industry didn't experience any downtime in 1982, and 1983 was expected to be an excellent year as well. These mills will continue to rely almost totally on the U.S. for their ledger grades, according to one close industry observer.

Over the last 10 years, while most grades of paper and board experienced a rising share of wastepaper in their furnish, the grades that use the highest percentage of wastepaper (recycled board, building papers, and boards) showed very low growth in demand.

Recycled board accounted for about 48% of U.S. paper industry wastepaper consumption in 1982, but this grade is expected to account for only 37% in 1993, according to DRI. Flat or slow growth in the recycled board segment should not put much pressure on wastepaper supplies during the next two decades, according to the Franklin report.

Mills that produce semichemical paperboard are expected to increase their use of wastepaper to 25% by 2000 from 20% in 1980, with a swing toward more corrugated and less box plant cuttings as mills install more sophisticated bleaching equipment, according to the Franklin report.

Production of unbleached kraft paperboard during the 1970s increased just 4% to 6% but is forecast to grow to 16% by 2000. Research on the use of corrugated continues and could result in even higher demand for corrugated from this segment of the industry, the Franklin report notes.

Some industry observers expect OCC will be in short supply for several years to come as more mills producing paperboard convert to using more secondary fiber. In an effort to avoid any possible shortages of OCC, the paper recycling division of the American Paper Institute has formed a special committee to investigate ways to increase OCC collections. ■

TABLE 6: **Total wastepaper demand summary.**

	1974	1982	1993
Demand for paper and board (000 short tons)	14,712	14,795	21,015
Demand by grade (%)			
In newsprint	3	8	9
In printing and writing	6	6	7
In tissue	8	12	12
In packaging and other paper	2	2	2
In kraft board	4	8	13
In semichemical board	6	9	11
In recycled board	59	48	37
In building paper and board	12	7	9
Other wastepaper demands	170	150	398
Export demand (000 short tons)	1,383	2,224	4,659
Export by country (%)			
To Canada	14	12	12
To Mexico	13	15	12
To Korea	12	23	25
To Italy	8	3	4
To Taiwan	4	21	24
To Venezuela	8	6	5
To Japan	16	5	4
To Other	25	15	14
Imports (000 short tons)	67	74	101
Total wastepaper recovery (000 short tons)	16,198	17,095	25,970

TABLE 7: **Total wastepaper regional demand summary.**

	1974	1982	1993
Demand for paper, board, and other (000 short tons)	14,882	14,945	21,060
Demand by grade (%)			
South	22	30	[illegible]
Northeast	30	21	17
North Central	36	34	29
West	12	15	17
Export demand (000 short tons)	1,383	2,224	4,659
South	35	26	18
Northeast	21	23	22
North Central	3	2	1
West	31	49	59
Imports (000 short tons)	67	74	101
By region (%)			
South	0	0	0
Northeast	31	34	33
North Central	57	47	40
West	12	19	27
Net trade between regions (000 short tons)			
By region (%)			
South	262	94	−571
Northeast	−159	−31	248
North Central	−259	78	605
West	156	−141	−282
Total wastepaper recovered (000 short tons)	16,198	17,095	24,470
By region (%)			
South	25	30	32
Northeast	29	21	18
North Central	31	30	27
West	15	19	23

Source: Data Resources Inc.

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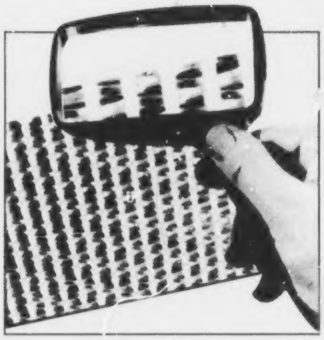

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COVER: *Augusta Newsprint's new twin-wire paper machine is the centerpiece of a $250-million expansion at that mill, which increased capacity by 711 tpd and included a new boiler, woodyard, TMP lines, and roll handling system. (Staff photo by Matt Coleman).*

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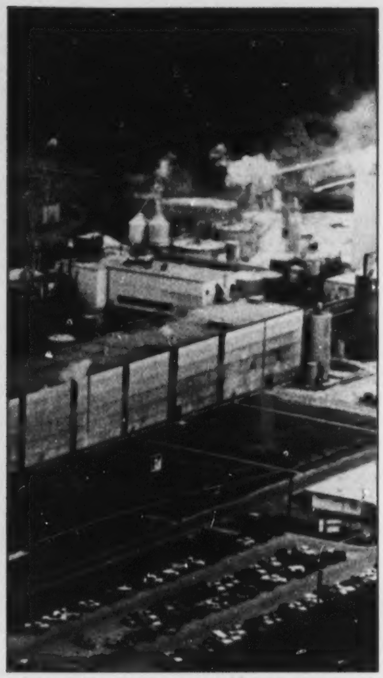

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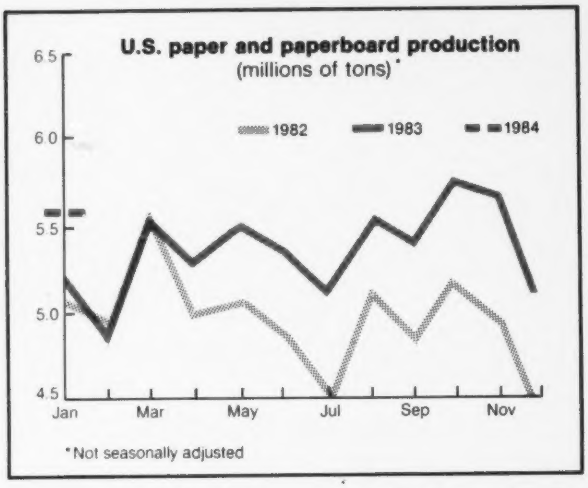
MONTH IN STATISTICS

U.S. paper and paperboard production in January totaled 5.6 million tons, sticking close to the record production levels posted in the last quarter of 1983, according to the American Paper Institute. Production in the first month of the year was up 6.8% compared to January 1983. The December-January two-month moving average of seasonally adjusted data stood at 68.6 million tons, matching the record high achieved late last year.

Among major grades, coated paper, up 12.7% from a year earlier, continued to show the largest gains. Uncoated free-sheet grades, however, lost considerable ground compared to the past few months, although shipments showed an increase of 4.1% year-to-year. Unbleached kraft packaging and industrial papers were off 3.9% from their year-ago rate. Paperboard grades showing strength included unbleached kraft liner, semichemical medium, and recycled. Corrugated box shipments totaled 22.1 billion ft^2, a record for the month and 10.4% higher than January 1983, according to the Fibre Box Assn.

Canadian newsprint shipments in January amounted to 699,000 metric tons, up 15.6% from a year before, Canadian Pulp & Paper Assn. statistics indicated.



*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	January	459	3.4	5,513	3.4
Uncoated groundwood (s)	January	125	6.8	1,483	7.0
Coated paper (s)	January	498	12.7	5,971	12.6
Uncoated free sheet (s)	January	737	4.1	8,840	4.1
Unbleached kraft packaging and industrial (s)	January	317	−3.9	3,805	−3.9
Tissue	January	410	4.9	4,920	5.0
Total paper	**January**	**2,831**	**5.8**	**33,970**	**5.8**
Kraft linerboard, unbleached	January	1,262	4.8	15,139	4.8
Semichemical medium	January	431	12.8	5,175	12.8
Bleached paperboard	January	320	−1.6	3,834	−1.8
Recycled paperboard	January	670	15.7	8,035	15.6
Total paperboard	**January**	**2,772**	**7.8**	**33,269**	**7.8**
Total paper and paperboard*	**January**	**5,603**	**6.8**	**67,239**	**6.8**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	December	4,124	16.2	n.a.	n.a.
Market pulp production	December	475	25.7	n.a.	n.a.
Wastepaper consumption at paper/board mills	December	1,157	12.9	n.a.	n.a.
Pulpwood consumption (cords)	December	6,741	13.0	n.a.	n.a.
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	January	22.070	10.4	22.070†	10.4
Containerboard inventories at box plants	Jan. 1	2,442	−5.7		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	December	775	28.1	8,986	12.0
Imports of Canadian newsprint	December	583	3.0	6,845†	5.6
U.S. paper exports (including products)	December	360	4.7	4,568	7.6
Exports of unbleached kraft linerboard	January	154	−14.4	1,951	−18.9
Exports of woodpulp	December	384	−14.4	3,644	7.3
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	January	699	15.6	669†	15.6
Operating rates	January	n.a. %	90%	n.a. %	90%
Inventories held by U.S. consumers	Jan. 31	1,232	−1.2		
Woodpulp shipments (export only)	January	572	32.1	572†	32.1
Operating rates	January	90%	74%	90%	74%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Uncoated printing/writing papers: Another record seems likely

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons[1]	7,847	8,680	9,040
Capacity, 000 tons	9,039	9,179	9,554
Utilization rate, %	86.8	94.6	94.6
Imports, 000 tons	169	220	210
Exports, 000 tons	71	60	60
Apparent U.S. consumption			
000 tons	7,945	8,840	9,190
lb/capita	68.7	75.7	78.0
000 tons/$ billion real GNP	5.35	5.75	5.75

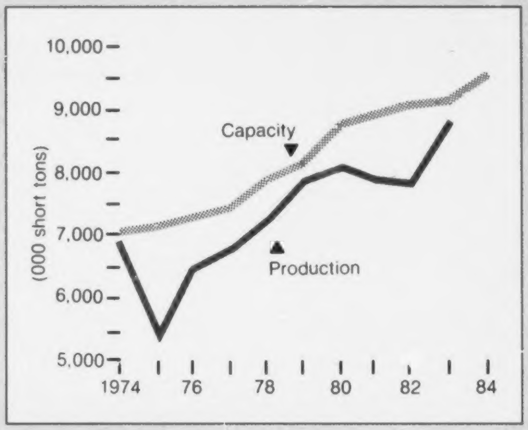
1. American Paper Institute data for shipments. e = *P&P* estimate.

GRADE STRUCTURE: Uncoated free-sheet papers are made from furnish consisting of 10% or less mechanical pulp; excluded from the category are products such as uncoated groundwood, cotton fiber, bristols and thin papers. Major end uses for uncoated free sheet include office papers (such as forms, copy, bond, tablet and envelope), printing papers (offset, cover and text), and miscellaneous (such as technical, papeterie or colored school).

PRODUCTION/CAPACITY: Tremendous resurgence was seen in 1983 as the industry came back from a two-year slump to set a new production record, with output up by 10.6% from 1982. That recovery was uneven, of course, with bond and cover and text papers gaining 14% over 1982 levels, while offset sheets were up just 6.5%. The big, volatile office copy market saw an outstanding 18% gain in output for the year.

Capacity rose just 140,000 tons in 1983, with only Champion International Corp.'s new 150,000-tpy unit at Courtland, Ala., starting up during the year. But a further 375,000 tons of capacity will come online in 1984, including a new Union Camp Corp. mill and a new Crown Zellerbach machine, plus a reconfiguration at International Paper Co.'s Georgetown, S.C., mill beginning in 1984. With Domtar Inc. also planning a major expansion in Canada starting in 1986, and Georgia-Pacific Corp. contemplating a new unit at Port Hudson, La., in the coming years—to name just two likely projects—demand will have to continue growing at a healthy pace to keep operating rates up.

OUTLOOK: Customers were placed on allocation by most mills in 1983 and order backlogs went out to six or eight weeks, but in late 1983 some inventory building seems to have taken place. By early 1984, customers began reporting they could get paper in excess of their allocations from many mills, and backlogs had dropped by a couple of weeks—or perhaps more, in the case of cut-size paper, where converting capacity has grown even faster than the hectic rise in consumption. Even so, copy paper demand seems likely to climb by as much as 8% in 1984, outstripping the 4% average increase for uncoated free sheet. Other sectors of uncoated free sheet are expected to show healthy growth closer to the industry's average.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	**Capacity share** (%)
1. Champion International	922	9.7
2. Boise Cascade	791	8.3
3. Great Northern Nekoosa	725	7.6
4. International Paper	675	7.1
5. Hammermill Paper	647	6.8
6. Union Camp	500	5.2
7. Georgia-Pacific	464	4.9
8. Weyerhaeuser	450	4.7
9. P.H. Glatfelter	430	4.5
10. Mead	398	4.2
11. Simpson Paper	355	3.7
12. Westvaco	210	2.2
13. Finch, Pruyn	200	2.1
14. Pentair	187	2.0
15. Scott Paper	160	1.7
16. Fraser Paper	150	1.6

U.S. annual capacity (1984): 9.554 million tons
Capacity share of top five companies: 39.4%
Capacity share of top ten companies: 62.9%

PRICING: Prices regained all the ground they had lost in 1982 and then some. Quotes in February 1984—even with minor scattered discounting by small, marginal mills in a few grades—were between 24% and 36% above year-earlier levels for the major commodity grades. Further price increases in 1984 might be stalled, however, until first quarter sogginess dissipates.

Two important grades were chosen as representative of pricing trends. Prices shown are year-end, $/short ton, list quotes. (The 1982 numbers shown in parentheses are estimated range of transaction quotes. List prices before and after 1982 are considered reliable.)

Book paper, No. 3 offset, 45-lb sheets—1974, $535; 1976, $506; 1978, $645; 1980, $813; 1981, $878; 1982, $878 ($680); 1983, $840. Forms bond, 15-lb rolls—1974, $470; 1976, $520; 1978, $538-$550; 1980, $697; 1981, $753; 1982, $753 ($640); 1983, $745.

MARKETS: Estimated shipments by end uses are: bond, mimeograph, duplicating, xerographic—24%; forms bond—21%; offset printing—26%; envelope—11%; tablet—5%; other—13%.

(News section continues on page 23)

SALES & EARNINGS

Canadian industry back in the black in 1983

CANADIAN PAPER INDUSTRY RESULTS

	Fourth quarter (C$000)				Full year (C$000)			
Paper companies	**Sales**	**Change 1983/82**	**Earnings[1]**	**Change 1983/82**	**Sales**	**Change 1983/82**	**Earnings**	**Change 1983/82**
Abitibi	C$426,400	2.7%	15,200	1282%	C$1,660,180	1.6%	C$38,013	−38.0%[2]
B.C. Forest Products	238,800	20.0	(4,400)	n.m.	899,700	12.6	(32,700)	n.m.
Canfor	240,100	40.4	(16,800)	n.m.	995,100	36.4	(44,700)	n.m.
Con-Bathurst	349,100	−0.2	17,400	95.5	1,393,000	−2.3	43,000	−19.5
Crown Forest	184,900	13.6	(2,800)	n.m.	727,300	11.1	(17,200)	n.m.
Doman					175,400	34.2	4,007	n.m.[3]
Domtar	479,100	16.0	16,400	n.m.[3]	1,820,000	7.9	40,900	349.5
Donohue	94,400	15.8	6,100	60.5[2]	357,900	13.5	9,400	−43.0
Great Lakes	133,112	38.6	(1,755)	n.m.	494,981	13.0	(9,936)	n.m.
Mac. Bloedel	521,400	17.2	13,500)	n.m.[3]	2,040,000	10.9	2,800	n.m.[3]
Rolland	63,000	36.4	2,953	368.0	229,700	36.3	8,333	n.m.[3]
Weldwood	140,075	31.8	(791)	n.m.	586,153	41.2	9,568	n.m.[3]
Total	**2,870,387**	**15.5**	**45,007**	**n.m.[3]**	**11,379,414**	**11.2**	**51,485**	**n.m.[3]**

1. Income after taxes, form continuing operations, exluding most significant nonrecurring items in both years.
2. 1982 figure restated by company.
3. Not meaningful due to loss in 1982 quarter.

( ) = loss. n.m. = not meaningful.

Although slower to benefit from the economic recovery than their U.S. counterparts, most Canadian pulp and paper companies reported healthier earnings for the 1983 fourth quarter and year, particularly in comparison to severely depressed results in 1982. The 12 companies surveyed by *P&P* reported profits for 1983 of C$51.5 million; the same group suffered losses totaling $184.4 million in 1982. Sales were up 11.2% year-to-year. Fourth-quarter performance also improved, with the 12 firms reporting earnings of $45.0 million compared to losses of $93.0 million in 1982.

Fourth-quarter results were also up compared to the third quarter, reflecting higher shipments and firming prices in some grades. Lumber prices remained stubbornly depressed, however, and the Canadians also continued to suffer in the pulp markets, where the strong U.S. dollar and tough Scandinavian competition have hindered recovery.

While most eastern Canadian producers were back in the black, several western firms continued to report losses. Canadian Forest Products Ltd. was the largest firm still in the red, reporting losses of $44.7 million for the year and $16.8 million for the fourth quarter. Year-earlier losses totaled $85.7 million for the year and $34.5 million for the quarter. Canfor did produce a small operating profit in 1983, however, leading president and CEO P.J.G. Bentley to express "cautious optimism" with respect to prospects for 1984.

British Columbia Forest Products Ltd. posted net losses of $32.7 million for 1983, compared to a loss of $61.0 million the year before. BCFP's fourth-quarter deficit was $4.4 million, up from a $20.1-million loss in the 1982 quarter. Crown Forest Industries reported a net loss for the year of $17.2 million, compared to a loss in 1982 of $23.3 million. CFI posted fourth-quarter deficits of $2.8 million; in the year-earlier quarter, the company lost $3.5 million. British Columbia Resources Investment Corp.'s subsidiary BC Timber also remained in the loss column, reporting a deficit of $11.0 million for the year, compared to a loss of $54.5 million in 1982.

After losing $93.3 million in 1982, MacMillan Bloedel Ltd. bounced back to post a modest profit of $2.8 million for 1983. MB's fourth-quarter net was $13.5 million, compared to a year-earlier loss of $37.3 million.

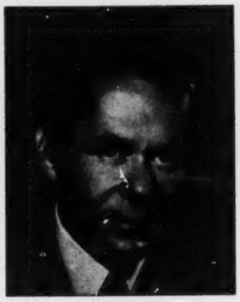
In the East, Domtar Inc. posted net earnings of $40.9 million for the year, a 350% improvement over 1982. Fourth-quarter net totaled $16.4 million, compared to a year-earlier loss of $4.5 million. Higher sales volumes and the resumption of full operations in the packaging group after a strike in 1982 contributed to the improvement, the company said. Abitibi-Price Inc. reported 1983 net income of $38.0 million, down 38.0% from 1982. Fourth-quarter earnings of $15.2 million were up twelve-fold from the year before, however.

Consolidated-Bathurst Inc.'s 1983 net of $43.0 million was down 19.5% from 1982. Fourth-quarter earnings of $17.4 million were up 95.5%, however, a gain the company attributed to lower costs and better results in bleached pulp.

Great Lakes Forest Products Ltd. was the largest eastern firm still showing red ink. GLFP posted a loss of $9.9 million for the year, about half the deficit posted in 1982. Fourth-quarter losses totaled $1.8 million, compared to a $4.4-million loss in the year-earlier quarter.

Late-reporting U.S. companies. Several U.S. paper companies released their year-end results too late for *P&P*'s U.S. earnings roundup (*P&P*, Mar., p. 23): Fort Howard Paper Co. posted record sales and earnings for the year, with net income of $107.0 million up 15.8% from 1982. Stone Container Corp. reported a loss for the year of $2.9 million compared to a loss of $14.2 million in 1982. P.H. Glatfelter Co.'s 1983 net of $20.6 million was up 3.5% from 1982. Pentair Inc.'s net was $11.9 million, up 13.4% over 1982, and Mosinee Paper Corp.'s net of $7.1 million was up 79.0%.

When is a concession an advance?



Julian M. Kien *is contributing editor-human resource management for* Pulp & Paper. *Kien is president of Kien Associates Inc., New York, N.Y.*

The latest catch phrase in the conventional wisdom of labor relations pundits has it that 1983 marked the end of wage concessions in collective bargaining.

Quite appropriately, the economic reality of the recent recession was a decline in the level of wage settlements.

Those industries with low-wage foreign competition (the auto and steel industries immediately come to mind) featured cuts and freezes in pay and the permanent elimination of thousands of jobs.

For the full year of 1983, the Bureau of Labor Statistics reported that workers in manufacturing jobs averaged a 3.2% increase in wages, while those employees with cost-of-living allowances registered a decline of 0.7%—the first such negative result in the 25-year history of that statistic. This is in sharp contrast to the double digit figures of only three and four years ago.

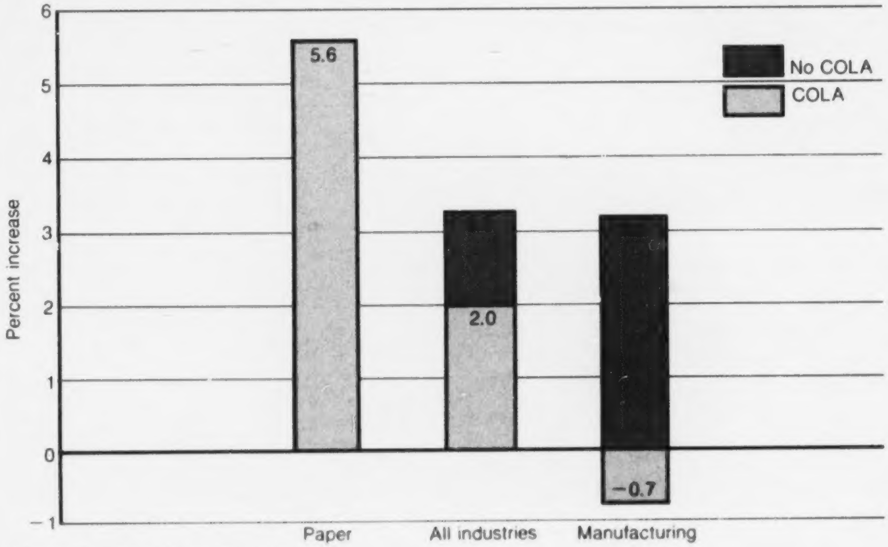
Defining a concession as a freeze or reduction during the first year of a new labor contract, the Bureau of National Affairs, a respected private research company, counted 159 settlements with concessions in 1982 and 430 through most of 1983—a most impressive record.

In contrast, the pulp and paper industry, which in 1981 and 1982 saw declines in profits, approached these hard times by giving an average wage increase of 8.7% in 1981, 6.9% in 1982 and 5.6% in 1983. As reported by the BLS, hourly earnings in the pulp and paper industry increased by 8.4% over the past two years. Paper mill employees have gone from earning an *average* of $9.70/hour in 1981 to $10.85/hour in 1983. These rates vary considerably, depending on region, product, age of mill, etc.

CONCESSIONS? NOT REALLY! What did management obtain in exchange for those significant increases? Concessions included the right to schedule work on previously restricted holidays (a right that often produces double time for the highly paid paperworker and might mean $40.00/hour!); a modification in health care packages that might produce the *sharing* of future premium increases; and the right to assign work outside of the restrictive limits of antiquated work rules.

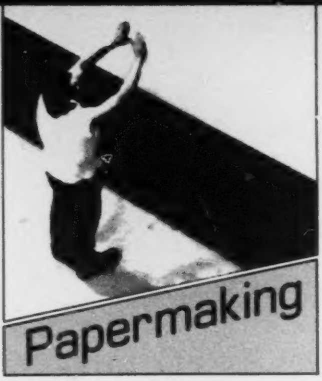
Somehow, these concessions seem like reasonable gains—particularly when we consider the 8 million people who are still unemployed. No business can long continue to be profitable if it forgets the marketplace. Some lessons can be drawn by asking GM (and its new partner, Toyota), Bethlehem Steel (with its request for tariff protection from European imports), and the shoe industry (which one has to contact at a Korean address) about ignoring low-cost foreign competition.

Lest we forget, pulp and paper is also manufactured in a number of locations that have no U.S. zip code.



1983 U.S. wage settlement (through December 1983).

Source: Bureau of Labor Statistics, API.



You can save energy on your older linerboard or newsprint machines

Many proven methods are available to cut energy consumption on most machines by 10% to 30%; payback period is often less than one year

By RICHARD REESE and HANNU PAULAPURO

■ The cost of energy has risen much faster than other paper mill operating costs in recent years. The paper industry is especially vulnerable to increasing energy costs since it is the third largest energy consuming industry in the U.S. In 1979 the paper industry consumed 10.2% of purchased fuels used by all manufacturers. Since energy costs are a significant factor in mill operating costs, paper mill management must closely evaluate papermaking processes to conserve energy and to remain competitive.

Some new mills and paper machines have many energy saving concepts designed into their systems. But only 15% of the papermaking capacity in North America is on machines started up since 1970. Papermaking and energy conservation technology have changed significantly since most paper machines were built. For example, double-felted presses had very limited application before 1975 but are now widely accepted for increasing dewatering on heavyweight grades. Excellent potential exists for reducing energy consumption on many older and smaller machines. Accordingly, these machines are excellent candidates for energy conservation projects.

This article will summarize proven opportunities for reducing energy consumption in papermaking on typical 1960- to 1970-vintage newsprint and linerboard machines in the U.S. Close scrutiny of energy consumption has revealed many areas where energy can be saved, often with limited capital expenditure. Proper application of current technology can provide significant improvements in nearly all mills.

WAYS TO SAVE ENERGY. The first step in improving energy utilization is to determine current performance. Despite the high cost of energy, many mills do not have accurate data on energy consumption and key operating parameters such as the amount of steam condensed outside the dryers. Routine energy consumption and performance monitoring is necessary before a conservation program can provide meaningful results. Typical newsprint and linerboard machines are used as examples in this article. Energy cost estimates of $4/1,000 lb of primary steam and $225/hp-year were used in cost calculations. These numbers vary significantly between mills. Opportunities for reducing energy costs for both example machines are summarized below.

Both example machines use primary steam to **heat whitewater** on a continuous basis. This is indicative of open whitewater systems. Significant closing in these whitewater systems often can be achieved by converting from the use of freshwater to clarified whitewater for wire showers and other uses around the wet end. When the primary whitewater loop is closed, whitewater must only be heated after cold startups, and continuous steam addition can be eliminated.

In addition to saving energy, the volume of effluent to be treated leaving the plant is reduced. High closure of the whitewater system can cause problems with dirt and chemical buildups in the wet end system. However, each mill should conduct trials to determine how far it can go in tightening whitewater systems without causing significant operating problems.

Fourdrinier table configuration on linerboard machines can have a significant impact on overall paper machine performance and energy conservation. Replacing table rolls with hydrofoils and vacuum-augmented foil units has provided drying energy savings of up to 15% or a comparable production rate increase on linerboard grades. The key appears to be implementing a table that helps develop favorable sheet structure for burst strength (mullen) so that total refining horsepower can be reduced, and the sheet presses and dries more easily.

Optimized fourdrinier table configurations for formation, sheet structure, and machine runability can also provide energy savings on newsprint machines. Good table design can permit running higher freeness levels on both mechanical and chemical pulps. Higher stock freeness provides better dewatering in the fourdrinier, press and dryer sections.

The example linerboard machine has a **steam box**

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over the last flatboxes that is consuming 40,000 lb/hour of steam. Heating of the sheet reduces the viscosity of the water in the web and increases dewatering at the couch and in the press section. Proper fourdrinier steam box operation can improve wet end performance by reducing web breaks and sheet crushing tendencies in the first press nip. However, fourdrinier steam boxes can be very inefficient from an energy utilization standpoint. Many liner machines are adding 3.5 to 5 lb of steam on the fourdrinier to remove 1 lb of extra water from the web. This compares to 1.3 to 1.5 lb of steam/lb of water evaporated in the dryer section. Current design steam boxes provide more efficient steam utilization and offer cross-machine profiling capability.

Replacing inefficient steam boxes with modern design units has reduced steam consumption by as much as 75% while maintaining previous machine speeds. The replacement of existing steam boxes is often easily justified by more efficient steam utilization and profile control capability. Many of the old steam boxes created moisture profile problems in addition to very inefficient use of steam. Unless waste steam is available to be used in the steam box and/or sheet runability is significantly improved, steam application to the sheet on the fourdrinier should be carefully evaluated. The impact of the added steam use on total mill energy generation and consumption must be considered.

Most machines installed before 1970 include **suction press rolls** in both the first and second press positions. Because of limited load capability of many suction roll shells, increased dewatering could be achieved by replacement with grooved or blind-drilled rolls. In addition to increased sheet dewatering, often a vacuum pump can be shut down, and roll maintenance is significantly reduced. On almost all machines, the second suction presses can be replaced with other types of vented rolls.

On linerboard grades heavier than 33 lb/1,000 ft², water flow resistance in the sheet is a primary restriction to water removal in press nips. By putting a felt on both sides of the sheet, the water has only half as far to travel to get out of the sheet, hence improving dewatering. **Double felting** also increases nip width and dwelltime, which are beneficial to water removal on the heavyweight grades. The large number of linerboard machines converting to double-felted presses in recent years confirms the benefits of double felting. Sheet consistency increases of 2% are typical at the same press loadings as single-felted nips.

Double felting the last press for lightweight grades such as newsprint often results in lower sheet consistency due to greater rewet leaving press nips.

Felt construction can have a major impact on sheet dewatering on lightweight sheets such as newsprint.

TABLE 1: **Energy savings potential—newsprint machine.**

Item	Potential savings/hour lb of steam	Annual savings ($)	Approximate capital investment ($)	Payback period (years)
Whitewater heating	3,200	108,000	—	—
Convert second press suction roll	350*	79,000	—	—
Felt design change	5,000	168,000	None	—
Press steam box	6,000	202,000	100,000	0.50
Steam and condensate design	7,000	235,000	200,000	0.85
Heat recovery/hood enclosure	7,000	235,000	800,000	3.40
Moisture profile improvement	4,000	134,000	400,000	2.99
1% operating efficiency improvement	—	42,000	—	—

*Horsepower savings.

TABLE 2: **Energy savings potential—linerboard machine.**

Item	Potential savings/hour (lb of steam)	Annual savings ($)	Approximate capital investment ($)	Payback period (years)
Whitewater heating	6,700	225,000	—	—
Table changes	13,000	437,000	200,000	1.19
Replace steam box	30,000	1,008,000	100,000	0.10
Convert second press suction roll	350*	79,000	—	—
Double felting	15,000	504,000	1,000,000+	2.0+
Use smoothing press	13,000	437,000	None	—
Steam and condensate system	19,000	638,000	200,000	0.31
Heat recovery/hood enclosure	19,000	638,000	700,000	1.10
Moisture profile improvement	10,000	336,000	500,000	1.49
1% operating efficiency improvement		99,000	—	—

*Horsepower savings.

TABLE 3: **Machine data—improved.**

	Newsprint	Linerboard
Basis weight	30 lb/3,000 ft²	42 lb/1,000 ft²
Reel trim	250 in.	250 in.
Machine speed	3,000 fpm	1,700 fpm
Production	395 tpd	940 tpd
Operating efficiency	87%	88%
Moisture content leaving presses	58%	58%
Reel moisture	8%	8%
Maximum steam pressure	50 psig	150 psig
Dryer hood exhaust volume	127,500 cfm	304,000 cfm
Vacuum system		
Total cfm	48,000	53,000
Brake hp	2,300	2,650
Machine drive		
Normal running load (hp/in./100 fpm)	.431	.592
Operating drive hp	3,490	2,720
Steam consumption (lb/hour)	59,500	150,000
Steam to heat whitewater (lb/hour)	—	—
Steam to fourdrinier press steam box (lb/hour)	4,500	10,000
Steam to dryers (lb/hour)	55,000	140,000
Steam to heat PV supply air (lb/hour)	—	—
Lb steam/lb water evaporated	1.52	1.61
Lb steam/lb paper	1.81	1.91
Btu/lb water evaporated	1,519	1,634
Million Btu/ton paper	3.62	3.89

The use of fine batt deniers on the surface of batt-on-mesh design felts for newsprint has provided sheet dewatering improvements of up to 3%. The fine batt provides more uniform contact between the sheet and felt in the press nip. Finer batt surfaces also reduce sheet rewet in the press nip. Since felts with fine denier batt have a greater tendency to fill, fine batt is only used on the top layers of batt on the sheet side. Many newsprint machines have problems with pitch filling press felts. High pressure mechanical and chemical cleaning techniques must be used to control filling before full advantage of stratified batt felts can be achieved.

Except for the top position of double-felted nips, felt design generally has a limited effect on initial sheet dewatering on liner grades. Although modern batt-on-mesh felt designs can provide constant dewatering over longer periods of time than batt-on-base designs, initial sheet dewatering generally shows little difference.

While steam utilization efficiency is typically low for fourdrinier steam boxes, properly applied **steam showers in the press section** can be very efficient on newsprint machines. On one recent installation in Canada, the steam flow to the steam box was 4,600 lb/hour. When the steam box was turned on, steam use in the dryer section fell from 93,000 lb/hour to 80,000 lb/hour for a net savings of 8,400 lb/hour at the same machine speed. Steam showers in the press section are generally most effective when installed just ahead of the last press nip. In addition to improving sheet dewatering, steam application to the web in the press section softens the fibers. This facilitates compression of the fiber mat and provides less spring back, which reduces sheet rewet.

Sheet rewet can decrease sheet consistency up to 3% if the sheet and felt are not separated immediately after the press nip. Sheet rewet after early presses often is not a major problem since water that migrates back into the sheet may be easier to remove by succeeding presses. Sheet rewet after the last press is critical since the added water must be evaporated in the dryer section. Sheet rewet is more critical on newsprint grades than on liner because, although the volume of water transferred back to the sheet is similar, the total transferred water volume is a much greater percentage on news than on liner.

Some liner machines are making effective use of **smoothing presses** between the last felted press and the first dryer. Trials indicated up to 7% less steam consumption in the dryer section at the same speed with the smoothing press down. Improvement is apparently related to easier drying due to the sheet being thinner and having a smoother surface. On liner machines that have smoothing presses installed, but which are not used routinely, trials should be conducted to determine the effect of smoothing press use on steam consumption.

TABLE 4: **Annual energy costs—improved.**

	Newsprint	**Linerboard**
Steam cost	$4/1,000 lb	$4/1,000 lb
Power cost	225 hp-year	225 hp-year
Vacuum system drive	518,000	596,000
Machine drive	785,000	612,000
Steam	1,999,000	5,040,000
Whitewater	—	—
Fourdrinier/press/steam box	151,000	336,000
Dryers	1,848,000	4,704,000
PV supply air	—	—
Grand Total	**3,302,000**	**6,248,000**
Vacuum drive cost/ton	3.75	1.81
Machine drive cost/ton	5.68	1.86
Steam drive cost/ton	14.46	15.32
Whitewater	—	—
Steam box	1.09	1.02
Dryers	13.37	14.30
PV supply air	—	—
Total energy cost/ton	**23.89**	**18.99**

About 58% and 65% of the total energy costs on news and liner machines, respectively, result from steam use in the dryers. For optimum steam utilization efficiency, steam must be condensed in paper dryers so that its heat value can be transferred to the paper web. Since 10% to 20% blowthrough steam is required to evacuate the condensate, this blowthrough steam must be recirculated or reused in other dryers for efficient steam utilization. On well-designed **steam and condensate systems**, less than 5% of the supply steam is condensed outside dryer cans. Many older machines are condensing as much as 25% of the supplied steam outside dryer cans.

For thermocompressor systems, 3% to 5% of blowthrough steam should be removed from the recirculation loop to avoid the buildup of noncondensable gases. In many mills this steam is vented to the atmosphere. Some mills are now using this vent steam to supply early dryers with substantial savings.

Efficient temperature control and condensate recovery from the first few dryers after the last press have been a problem to newsprint makers for many years. The temperatures of early dryers must be gradually increased to avoid case hardening of the sheet surface, fiber buildup on the dryer surfaces and sheet flutter. Temperature graduation requires individual control of steam supply to each dryer for optimum results. Condensate removal to a common header from dryers at different operating pressures is typically achieved by operating the condensate receiver tank at a vacuum. Even if efficient condensate removal is achieved, a substantial amount of blowthrough steam must be condensed. One effective way to achieve good control of early dryers with high steam utilization efficiency is the use of small, packaged thermocompressor systems for each one or two dryers. This approach results in very little steam being condensed outside the dryers.

One way of saving steam on thermocompressor systems is to control blowthrough steam rather than differential steam pressure. A steam flowmeter is installed on the flash steam line between the separator tank and the thermocompressor. A controller maintains flash steam as a constant percentage of the steam being condensed. During machine breaks, flash steam as a percentage of condensed steam is held constant, and motive steam flow is reduced because the blowthrough steam carries less condensate from the dryers. This control automatically reduces differential pressure as the condensing rate drops with the sheet off the dryers. The annual savings depend on the mill steam generation system, the number of web breaks and other factors. This concept has been successfully implemented on both newsprint and linerboard machines.

The recovery of **heat from dryer section hood exhaust** is rapidly gaining acceptance as energy costs escalate. In the early 1970s, heat recovery could typically only be justified in the northern U.S. and Canada. With higher energy costs, these systems can economically be justified in all parts of the U.S. except the deep South. Air-to-air and air-to-liquid economizers are used to recover heat for use in heating pocket ventilation supply air or process water. Some mills are now recovering enough steam from dryer hood exhaust and other process areas so that no makeup steam is used for building heating and pocket ventilation supply air.

Enclosing the hood on a dryer section significantly reduces the volume of air that must be heated for efficient paper drying. The exhaust volume from an open hood is typically 25 lb of dry air/lb of water evaporated. For an enclosed hood, an exhaust volume of 10 lb of dry air/lb of water evaporated is adequate. Since all air used to remove water vapor from the dryer pockets must be heated to avoid sweating in the dryer hood, substantial extra energy must be used to heat the additional air.

A good **moisture profile** permits increasing the average sheet moisture content and selling more water and less fiber. When the moisture profile is poor, some areas of the sheet must be overdried to ensure that the wet areas will perform satisfactorily in the news pressroom or boxboard plant. Since water is more difficult to evaporate from the sheet at low moisture contents, excessive steam is used. Reducing the average moisture content from 9% to 6% can increase steam consumption by up to 8%. Prerequisites for a good moisture profile at the reel include low variation in cross-machine direction (CMD) basis weight and uniform dewatering in the forming, pressing and drying sections. Obviously, the source of moisture profile variation should be identified and corrective actions taken.

One of the best ways to conserve energy is to improve paper machine performance by achieving **higher operating efficiency** and reducing rejects. Stock recirculated at the wet end or reprocessed after drying is a double user of energy. Frequent web breaks result in wasted machine and vacuum pump drive horsepower and off-quality production at the reel. Operating efficiency improvements can result in added productivity with little or no extra energy costs. For the news and liner machines studied, each 1% increase in operating efficiency would provide energy savings of $42,000 and $99,000 per year, respectively. The savings is in addition to the incremental profit from the added production.

SUMMARY. Major items with high energy savings potential from upgrading performance on news and liner machines are noted in Tables 1 and 2. Many of the savings can be achieved with little or no capital expenditure. Other items have payback periods of less than one year, which would receive approval in most mill capital expenditure approval systems. As fuel costs continue to rise, the savings potential will increase and the payback periods will decrease if energy costs continue to increase faster than capital equipment costs. Projects that are easiest to implement and have the shortest payback period should receive the highest priority.

As noted in Tables 3 and 4, reduction of energy consumption using current proven technology can have significant impact on annual energy costs. This data reflects the results of improving paper machine efficiency and implementing some of the other items listed in Tables 1 and 2. A comparison of annual energy costs before and after improvement is shown in Table 5. The major opportunities for savings are in steam utilization efficiency. Although vacuum system and machine drive horsepower can often be reduced, the annual savings are typically much less than steam savings.

Many of the machine changes that provide energy savings can be taken instead as added productivity. Any changes that result in a drier sheet leaving the presses or a sheet that gives up water easier in the dryer section may be taken as productivity increases instead of energy savings if pulp is available and all machine sections and market conditions can support higher speeds. A rule of thumb is that each 1% increase in sheet consistency leaving the press section permits a 4% energy savings or 4% increase in machine speed. Capital investment payback is usually shorter when improvement potential is taken as added production rather than energy savings. When production is raised using the same steam consumption, the cost of steam per ton of paper goes down.

The impact on total mill energy consumption must be considered when energy conservation opportunities are evaluated. The implementation of individual projects must provide a net savings in fuel cost for the mill to become more profitable. For example, the installation of a press section steam box on newsprint can have significant impact on the steam generation system. In the example noted, dryer section 50-psig steam consumption was reduced by 14%. Low pressure (15-psig) steam usage for the steam box increased by 4,600 lb/hour.

In a typical mill power plant generating some of its own power, this change in steam consumption would likely result in slightly lower fuel consumption, less internal power generation, and higher purchase of external power. Net savings could depend on fuel cost, internal power generating costs, and external power costs.

Although many paper companies have implemented energy conservation programs, significant potential still exists for reducing energy consumption on nearly all paper machines. Accurate monitoring of energy consumption and key operating parameters that have a significant impact on energy consumption is essential for effective energy conservation. This requires installing flowmeters, recorders, and other sensors and routine calibration checks to ensure accurate readouts. The application of current proven technology to paper machines in North America could result in an energy saving of 10% to 30% of current consumption. With the rising cost of energy sources, the incentive is certainly there to roll up our sleeves and get to work. ■

TABLE 5: **Annual energy cost savings.**

	Newsprint	**Linerboard**
Vacuum system	$79,000	$79,000
Machine drive	—	—
Steam	696,000	3,551,000
Whitewater	108,000	225,000
Fourdrinier/press steam box	(151,000)	1,008,000
Dryers	504,000	1,680,000
PV supply air	235,000	638,000
Grand total	**775,000**	**3,630,000**
Vacuum drive cost/ton	0.67	0.31
Machine drive cost/ton	0.15	0.06
Steam drive cost/ton	5.54	11.65
White water cost/ton	0.80	0.71
Steambox cost/ton	(1.09)	3.20
Dryers cost/ton	4.08	5.74
PV supply air cost/ton	1.75	2.00
Total energy savings cost/ton	**6.36**	**12.02**

CPPA technical meeting features comprehensive, balanced program

The 70th annual meeting of CPPA's Technical Section included 41 sessions on topics from woodhandling to paper finishing to market outlook

By JOHN C.W. EVANS, Senior Editor and
DAVID R. ALLAN, Associate Editor

■ The annual meeting of the Technical Section, CPPA, held in Montreal in early February, had a resurgence in attendance and a filled-to-capacity equipment exhibit. This meeting will apparently be the largest of its kind in North America during 1984. A total of 135 technical presentations and seven panel discussions were included in the 41 sessions. Almost every aspect of pulp and paper production, from wood to finishing, was covered during the five-day program.

An interesting feature of the program were the three joint sessions with the Woodlands Section of CPPA, which held its annual meeting at the same time. Subject matter of these sessions were wholetree chips, timber management and wood use, and Canadian pulps in world markets.

Twin-wire and top-wire formers were discussed by a panel consisting of representatives from seven mills with recent installations—five top-wire and two twin-wire units.

The most frequently discussed topic was heat recovery from pressurized disc refining of chips (TMP and CTMP). A total of 11 papers were devoted to this subject. Ten of these discussed recovery as steam, and one described a mill installation where hot water is produced using steam from the refiners.

There may be as many as 20 successful mill installations worldwide, with more than half of these in Scandinavia and Finland. Energy recovered as heat can be near 80%, depending primarily on the level at which the heat is recovered.

BLEACH MIXER SAVES CHEMICALS. Great Lakes Forest Products Ltd. outlined the benefits obtained from improved chemical mixing achieved at its Thunder Bay, Ont., mill in the first chlorine dioxide (D_1) stage, following the replacement of an inline static mixer system with the recently developed Kamyr medium-consistency MC mixer.

Considerable chemical savings have been realized in the chlorination stage (C stage) due to an increase in the first extraction stage (E_1) terminal K number target. In addition, a very significant reduction in shive content in the fully bleached softwood pulp has been achieved since installing the MC mixer in the D_1 stage.

The increase in caustic extraction K number target in the E_1 stage has resulted in chemical savings in the high-substitution C stage, with no significant change in chlorine dioxide consumption in the D_1 and D_2 stages.

The D_1 stage tower retention time, temperature, and washer vat residual have all been lowered, while the tower consistency and production rate capacity have been increased.

Since a net increase in power consumption will cost $20,000/year, together with minimal maintenance requirements, the estimated yearly savings with the MC mixer will range from $365,000 to $620,000.

TABLE 1: **Canadian pulp and paper shipments, 1982-84 (000 metric tons).**

	1982	1983p	1984e	% change 1983-84
Shipments by grade				
Newsprint	8,075	8,450	9,100	7%
Printing, writing, sanitary	1,850	2,100	2,300	9
Packaging, papers, boards	2,450	2,750	3,000	9
Pulp exports	5,875*	6,925*	7,400	7
Total	18,250	20,225	21,800	8
Shipments by half-year				
First half	9,365	9,675	10,600	
Second half	8,885	10,550	11,200	
Total	18,250	20,225	21,800	
Shipments by destination				
Canada	3,890	4,200	4,530	8
U.S.	9,275	10,350	11,370	10
Overseas	5,085	5,675	5,900	4
Total	18,250	20,225	21,800	8

p=Preliminary. e=Estimated.
*Revised to include estimated shipments of a mechanical pulp mill not reporting to CPPA.
Source: Canadian Pulp & Paper Assn.

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A joint program between Abitibi and Union Carbide Canada has resulted in the successful implementation of a static mixer for an oxidative caustic extraction stage in Abitibi's Smooth Rock kraft bleaching stage

SHEET TEMPERATURE. The Beloit research department discussed its recent studies concerning the effect of sheet temperature on water removal in the press section, using different furnishes. These furnishes included both bleached and unbleached softwood kraft, sulfite, and groundwood pulps.

Temperature was varied from 27°C to 82°C (80°F to 180°F) for various combinations of basis weight, pressing pressure and dwelltime, ingoing dryness, and level of refining. It was found that a simple multiplication by viscosity ratio does not apply. An overall average for water removal is approximately 1% dryness increase for every 11°C (52°F) increase in sheet temperature. This value ranges from 0.6% to 1.4% dry/11°C. A more precise estimate can be determined by using equations derived by regression analysis for each furnish.

Caution should be exercised when pressing a high moisture sheet because the probability of sheet crushing increases with increased sheet temperature.

HIGHER C STAGE TEMPERATURES. Results from a study of the bleach plant C stage were presented by C-I-L Inc. Recycling of bleach plant filtrate has raised temperatures in the C stage (a survey shows this to be nearly 40°C, or 104°F, for North American mills).

The increase in C stage temperatures offers several potential benefits. In particular, the increased rate of chlorine reaction at elevated temperatures may result in chemical exhaustion long before retention time in the bleaching tower.

The "effective" bleaching time, which may therefore be shorter than the nominal retention time, can be lengthened by increasing the chlorination level to more closely match the bleach tower characteristics.

The increased chlorine consumption results in an increased amount of chlorination and oxidation of lignin. This, in turn, means that the limits of delignification during the extraction stage can be extended. In addition, the increased lignin modification that occurs during the bleach plant C stage reduces the need for harsh extraction conditions.

The gains in delignification need not be sacrificed by pulp strength loss. Small amounts of ClO_2 added in the optimum manner prevent carbohydrate degradation. A study of fully bleached pulps chlorinated at different C nesses, there were no significant strength differences apparent among the pulps.

TABLE 2: **Canadian operating rates, 1982-84.**

	1982	1983p	1984f
Newsprint	81%	85%	92%
Printing, writing and sanitary	82	90	90
Packaging papers and boards	79	88	93
Market pulp	75	88	93

p=Preliminary. f=Forecast.
Source: Canadian Pulp & Paper Assn.

STATIC MIXER. An interesting paper reported that a joint development program between Abitibi-Price Inc., at Smooth Rock Falls, Ont., and Union Carbide Canada Ltd. has resulted in the successful implementation of a static mixer for an oxidative caustic extraction stage in the Smooth Rock kraft bleaching stage.

The initial findings of this project indicate that a static mixer, fitted with a Linde oxygen injector, can provide the mill with a 30% reduction in ClO_2 usage in the D_1 stage. Considerable savings in the system capital costs afforded by the static mixer, combined with process benefits comparable to those reported by other companies, make it a viable alternative to oxidative caustic extraction systems using dynamic mixers.

CALIPER CONTROL ON CALENDERS. A paper from Consolidated-Bathurst Inc. reported that it has developed and put into operation a new system for control of cross-machine caliper during calendering. The new system, marketed under the trade name Calcoil, utilizes induction heating to locally change calender roll diameters. It is considerably more powerful and faster than existing air cooling systems.

Encapsulated coils, positioned approximately 3 mm (0.12 in.) from the calender roll face, provide the heat. They are mounted on a common beam, which retracts automatically at a sheet break.

Heating system design is modular, and each unit has its own high-frequency induction generator, fed from the 110-v line. Each unit also has individual control of the induction heating power, which is adjustable from 0 to 1,500 w. The electronics are located in a cabinet situated on the calender stack walkway. An operator station allows manual or automatic control modes.

The Calcoil prototype was installed in the spring of 1983 on No. 3 newsprint machine at Consolidated-Bathurst's Port Alfred mill. This machine had automatic control of reel hardness by a conventional air shower system. Replacement of the air showers with the Calcoil resulted in a 63% decrease in reel hardness variability as measured by an on-machine hardness sensor. Five other machines of the company are now equipped with the Calcoil, tied into a process control computer, and six more will be installed shortly.

Other papers of broad interest included a report on woodfiring of a lime kiln at the ASSI mill in Sweden, Devron thermal-hydraulic actuators for automatic slice lip control, and the Lightnin in-tank consistency-control system.

ROSY OUTLOOK FOR MILLS. Turnaround was the name of the game for North American pulp and paper mills last year, and solid recovery is the forecast for 1984. That was the prospect that was outlined by speakers at the gathering.

CPPA president Howard Hart expects Canadian output this year to exceed 21.5 million metric tons, a new record and an increase of 6.4% over 1983—reaching a level approximately 20% higher than the depressed 1982 performance

CPPA president Howard Hart told delegates that his group expects Canadian output this year to exceed 21.5 million metric tons, a new record and an increase of 6.4% over 1983—reaching a level about 20% higher than the depressed 1982 performance.

This will bring operating rates from 79% in 1982 to 87% last year and just over 90% for 1984. Hart believes the U.S. industry will "operate at a similar or slightly higher rate of capacity in 1984, reflecting the strength and momentum of the U.S. economic recovery."

Mead Paper Group's group vice president A.D. "Pete" Correll Jr. told CPPA that he believes U.S. mills will actually run full-out or nearly full this year in printing/writing papers and paperboard. Correll also predicted that it will increase market share in its domestic market due to increased paper mill use of southern and hardwood pulps.

Linerboard mills in the U.S. should operate at 95% of capacity in 1984 and could do even better, Correll thinks, while box shipments are likely to rise by 6% to 7%. This comes after a year in which total U.S. paperboard operating rates averaged just 90%. And yet 1983 was not all bad news for linerboard, he noted. Box output rose by 7.5%, setting the stage for this year's strength in linerboard.

Coated paper mills and uncoated free-sheet producers should run "nearly full," in Correll's view, and the tightness in coated—which should last through 1984—may cause some consumers to switch to the slightly more available uncoated grades.

Uncoated mills will be doing quite well on their own, he added. Correll expects cut-size and forms paper shipments to jump by 6% and offset printing paper shipments to rise by 3%. Of the industry's major domestic consumers, only the book industry is expected to see no significant growth.

U.S. mill's overseas customers won't boost their purchases any more than book printers will, Correll cautioned. He sees the dollar remaining relatively strong, minimizing growth in exports.

There may be some variation in that pattern, of course, if last year is any guide. While overall paper and board exports were jumping 7.8% to 4.5 million short tons, board export shipments were shooting up 9.2% to 2.9 million tons.

On the other hand, paper exports tumbled 10.5% to just 850,000 tons. Wastepaper outshone everything else, with a 19.4% increase from 1982's depressed level, to 2.6 million tons.

Correll's forecasts are based on an assumption that real GNP will rise by 5% this year and industrial production by 9%, while housing starts will remain about 1.7 million and inflation will rack up a 5% increase. He also cited estimates that appeared in the January issue of *Pulp & Paper* placing board and paper operating rates at about 93%.

EXPORTS LOOK GOOD. CPPA's forecasts on Canadian performance for this year were also predicated in a 5% GNP rise, according to the group's David Wilson, although he conceded that such an estimate may change if the government deficits force interest rates up late this year, triggering a slowdown.

Using some of the same fundamental assumptions, however, CPPA came up with somewhat more optimistic forecasts in the export field. Dr. Wilson sees exports up 7% this year to 17.3 million metric tons, shipments to the U.S. up 10%, and to other markets up 4%.

This comes after a year in which shipments to the U.S. were up 12%. Canada enjoyed a "very strong increase" in exports to the Far East, although the European and Latin American markets stagnated. Overall export shipments jumped 12%.

Shipments to foreign markets helped Canadian mills to an 11% jump in shipments overall, and CPPA thinks that will be followed by an 8% rise in shipments to domestic and export customers this year.

Delegates reacted with a little skepticism to his prediction of a 92% operating rate for newsprint, although a number of newsprint executives did tell *P&P* they have been surprised by the strength of U.S. demand. But coming off a year in which Canadian newsprint operating rates averaged just 85%, a 92% year would be pretty pleasant for most in the industry.

One executive pointed out that Canadian mills ran at 88% in December, equal to the second-highest rate of the year, and that November actually reached 95%. The fourth quarter was the best period of 1983.

CPPA expects U.S. demand to reach 11.2 million metric tons this year, a rise of 5.8% over 1983, following last year's 5% growth rate. Canadian shipments should increase by 9% in 1984, a slight improvement over 1983's growth of 8%.

PULP MARKET STRENGTH. If newsprint was a problematic area, there were no questions about woodpulp: Canadian exports of pulp last year shot up 18% to 6.9 million tons, after a 13% drop the prior year. Shipments to the U.S. were up 16%, while shipments to overseas customers were up 20%.

Wilson noted that "the recovery phase of the cycle is about complete and further increases will be more inline with the growth of overall economic activity." Thus, he expects this year's pulp export shipments growth rate to be closer to 7%, with a 10% rise to the U.S. and Japan and an increase of about half that much to Europe.

If the CPPA forecast for woodpulp exports is on the mark, it would mean a 500,000-ton rise to 7.4 million metric tons—a record for Canadian industry. Not only would that be a new benchmark, but it would also represent a 1.5-million-ton improvement over the disastrous performance of 1982—and be welcome news for Canada's harassed industry. ■

Unseen side of computer's impact on the paper industry: the *plus* side

Not all the news is bad: computer printers, instruction manuals use paper, while computer magazines have already soaked up 150,000 tpy

By NORMAN WIENER

■ No single product since the invention of the office copier is expected to have as important an impact upon the future demand for paper as the personal computer. If we allow the definition of PCs to extend to any application requiring personal use of a computer—in both the office and the home—then the dimensions of this impact upon the future requirements for paper could clearly dwarf the impact on the uncoated free-sheet market resulting from copiers, high-speed copier-duplicators and electronic page printing systems.

PCs are expected to experience unparalleled growth over the remainder of this decade. By the end of the 1980s, close to 40% of all households will have PCs. In the office, it is quite likely that virtually everyone with a need will have access to a PC, and heavy users will have a workstation right at their desks.

Linking the PC in the home with those in the office has already begun. Low-cost modems (devices that allow one PC to communicate directly with another) will permit an increasing number of people to work at home, allowing them to finish or undertake tasks that often cannot be accomplished during a normal working day.

Many factors can be considered significant driving forces behind this growth in PC use. Some of the more important ones include:

TABLE 1: **Classes of magazines serving the personal computer market.**

Market group	Number of magazines in group	Total circulation for group (000)	Average circulation per magazine (000)	Total annual copies for group (000)	Average annual copies per magazine (000)
Business	19	1,687.8	88.8	30,730.6	1,617.4
Children	5	705.0	141.0	6,980.0	1,396.0
Dealer	10	219.8	22.0	4,056.1	405.6
Education	8	356.2	44.5	3,036.6	379.6
General interest	16	2,969.1	185.6	38,689.2	2,418.1
Home computing	4	555.2	138.8	6,662.4	1,665.6
Marketing and advertising	3	42.6	14.2	631.2	210.4
Miscellaneous	18	774.6	43.0	9,687.2	538.2
Software	6	363.3	60.6	3,579.6	596.6
Apple-related	7	454.2	64.9	5,193.6	741.9
Atari-related	3	280.0	93.3	1,800.0	600.0
Commodore-related	6	465.0	77.5	4,600.0	766.7
DEC-related	3	150.0	50.0	1,800.0	600.0
IBM-related	9	690.0	76.7	10,980.0	1,220.0
Kaypro-related	1	50.0	50.0	300.0	300.0
Radio Shack-related	10	671.5	67.2	8,058.0	805.8
Texas Instruments-related	2	200.0	100.0	3,150.0	1,575.0
Timex-Sinclair-related	2	150.0	75.0	1,800.0	900.0

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Software availability. The desire for PCs did not materialize until a program called VisiCalc (a product of VisiCorp) was developed. This single product illustrated to anyone who had ever had to place numbers on a columnar pad that there was a better way.

The next important development came from Lotus Development Corp., with the introduction of its Lotus 1-2-3—an integrated spreadsheet, database management, graphics, and word processing program. Literally light years more powerful than the original VisiCalc, this program is now considered to be the state of the art. These user-friendly software packages demonstrated that control over the most powerful of all tools was within reach.

Declining hardware prices. Prices for PCs have continued to decline over the past four-year period as the demand for their use has allowed manufacturers to build more efficient production facilities. Adding to this development has been declining prices for chips, which have enabled PC manufacturers to offer more memory at reduced prices in some cases.

The entry of IBM. Despite all the great efforts of Apple Computer Inc., Radio Shack, Commodore Business Machines Inc., Atari Inc., Texas Instruments Inc. and a slew of others, it was not until the introduction of the IBM PC that the current PC fever caught fire. Knowing that IBM Corp.'s commitment to the product would likely create a new and untapped market for software and peripherals, companies (both large and small) were more willing to commit the resources necessary to tap into this market.

The result has been nothing short of an avalanche—in both programs to run on the IBM PC and added devices to enhance or even replace the standard IBM configuration. IBM, unlike many of its other products, provided outsiders with an open architecture for these developmental activites. (More importantly, IBM, knowing that it has never been too strong on the programming end, was willing to bite the bullet and allow others to create the tools to spark the magic of its machinery.)

THE PAPERLESS SOCIETY MYTH. Being brought up in the paper industry, I have often been amused by predictions of a paperless society. Anyone who seriously examines the role of paper as a communication medium will come to understand that simply placing text or graphics upon a screen does not necessarily replace the need to have that same matter presented on a piece of paper. Until there is a readable screen in every office and home, functioning on the same operating system and capable of communicating a message with the same warmth and impact of print, there is little likelihood that paper can be toppled in the role that it fills today.

More likely, the reverse trend will take place. As more and more people obtain access to a personal or home computer, there will be an increased desire to print the information that has been created—whether it be a letter, report, graphics, a list, or a spreadsheet. The ability to share what one has created on his or her PC is inherent in most of the applications being developed today. And to a large degree, the primary way of sharing this output is by generating hard copy—on paper. Better yet, for those with access to high-speed copiers, each page of output stands to be copied several times over before it ends up in a paper file for future reference.

APPLICATION-RELATED FACTORS. To a large degree, each application generates its own specific demand for paper. Word processing—generally believed to be the most widespread PC application—has certain inherent differences from using a typewriter.

The most important aspect of computer-based writing is the ability to make changes as easily as re-keying new words. Computer-based typing has clearly changed the procedures and acceptance for grade-A final drafts.

TABLE 2: **Paper grades affected by personal computer growth.**

	Impact upon paper grade						
Factors affecting consumption	**Uncoated groundwood**	**Coated groundwood**	**Coated free-sheet**	**Uncoated book**	**Uncoated forms bond**	**Free-sheet bond**	**Other**
Application-related Word processing					M	M	
Spreadsheet					M		
Database/list management					X	X	X
Database mail/labels					X	X	M
Telecommunications	X				X		X
Graphics							X
Documentation-related		X	M	M			
Training-related	X	M	M	M			
Books	X		M	M			
Magazines	X	M					X
Directories	X	X		X			
Online databases					X		
Advertising, sales promotion		X	M				
Consumables					M	M	M

X=Impact area. M=Major impact area.

TABLE 3: **Estimated paper use by ten leading computer magazines.**

Magazine	Typical issue weight (oz)	Circulation (000)	Monthly tonnage(e)
PC	28	110	96
Byte	27	430	363
List	33	125	129
PC World	25	180	141
Rainbow	20.5	50	32
Tech Journal	16	50	25
Softalk	17	125	66
80 Micro	16	117.5	59
Personal Computer Age	15	50	23
Creative Computing	16	250	125
Total			1,059

e—estimate.

Typists with access to word processing equipment think nothing of running numerous printouts to correct the final copy. And since typewriters typically don't have the exact same typeface as the one on a hard copy printer, little can be done except return to the computer to generate another copy. Other factors that contribute to increased paper usage on a word processor include:

- The inability to accurately proofread off a screen
- The inability of the original writer to make comments or further corrections, assuming that the originator of the output is not the typist
- The ability of the writer to get a feel of the total layout and flow of a letter or report draft
- The tendency for a PC to generate output that does not correspond to the way it was originally inputted
- The frequent need to advance a complete page (when using continuously formed typing paper) to get the last page out cleanly. While this doesn't dramatically affect paper demand on a long draft, it doubles consumption for the many one-page documents that are created
- The occasional tendency of a computer printer to jam or shift the direction of the paper, thereby ruining the output created
- The use of continuous paper for typing (9 × 11), which increases the square inches per sheet to 99 from 93.5 (with a pre-cut 8-½ × 11 sheet)—an increase of 5.9% per sheet consumed
- The impact that touching one wrong key on a PC can have—generation of an undesired printout of the screen. This is a frequent occurrence with the use of the most popular word processing package (WordStar) and an IBM PC or XT.

In the use of spreadsheet software, other problems extend beyond these typical editing ones. The most common problems noted by users of this software, as they relate to increased paper consumption, include:

- The frequent tendency of a spreadsheet to be larger than the page it is designed to fit upon, which results in additional efforts to re-format the data
- The difficulty of proofing numbers off a screen, which often dictates preliminary output prior to creation of the final document
- The dilemmas of print formatting on a PC, exacerbated by the problems of incomplete instructions by the developers of the hardware and software as well as general user inexperience
- The ability to do "what-ifs," which allow a user to take a completed table, change one ratio or value, and completely rerun the results with a different scenario. Prior to the days of PCs, one table was sufficient for most presentations. Now it is popular to say that a table is a decision-support model—a dimension that a typewriter-typed sheet of paper will never possess.

With the use of a PC to undertake database or list management, the capabilities of a good software package allow the user to make more demands upon data than were considered in the old days. Quite often when someone asked for a list of potential prospects in Nebraska, the list was probably supplied on 3 × 5 cards.

Now that same list can be presented and ordered in numerous ways—by size of company, zip code, customers vs noncustomers, type of business, and so on. While the sales manager may need that list by zip code, the marketing or product manager may desire it by business type.

Each additional printout via the use of a database management system software package literally takes only minutes, depending upon the size of the list. However, to take those same 3 × 5 cards and reorder them manually literally took hours and would require retyping for each of its users. The PC capability for managing small amounts of data can be compared to the impact of the Volkswagen Beetle on the car industry—it is a phenomenon that will explode once it is fully understood.

In the area of telecommunications, where the PC will be used for electronic mail, the impact upon paper consumption can be considerable. If one assumes that most electronic mail messages are simply replacement of telephone communications, the impact will be significant.

For example, a telephone message pad sheet is typically the only notification of a missed call. With the use of computerized mail, it is likely that after (or even before) a message is read, it will be printed out on the available paper around the computer—typically an 8-½ × 11 sheet and not the 3-½ × 5 standard pad sheet. This difference means a possible increase of over 400% (in square inches) of paper per message consumed.

The use of a PC for generating graphics creates several new developments for increased paper consumption. This represents perhaps the newest management information tool, whose paper growth will be more of a function of new users and applications rather than the inherent problems of the application software itself.

Among users of graphic software, the most noted problems relating to paper consumption revolve around formatting of the final output, the inability to preview a final output, and the desire to layer results (i.e., to develop one graph with one result and then add each different factor to the graph).

DOCUMENTATION-RELATED FACTORS. No consumer or business product developed to date has created as much need for documentation as the PC. Whether we are talking about the home or personal computer, documentation requirements exist for:

- The operation of the computer (how to get it started, etc.)
- The operating system of the computer (with the IBM PC, the most popular operating system is MS-DOS, with MS standing for the programmer's originator, Microsoft Corp. and the DOS standing for Disk Operating System)
- The language of the computer (the most popular language of PCs is BASIC)

- The application programs that run on the computer (e.g., WordStar, VisiCalc, Lotus 1-2-3, etc.).

One version for all this documentation relates to the users of these products: basically, people who have never had a background in programming or systems design. Consequently, an item that might have taken one paragraph in a manual for programmers could conceivably take three pages in a newer documentation manual. You can imagine what this does to paper consumption when you multiply out the number of users buying PC systems each year. (For example, the DOS manual for the IBM PC contains 17 oz of cut paper and is considered small in comparison with most other manuals.)

Some of the factors relating to documentation that will dramatically affect paper consumption include:

- The sales of applications software, which will require a complete manual for each new user
- The sales of PCs, which generate the demand for an operating system, a DOS manual, and a language manual
- Multiple use of purchased software, which might require the initial purchaser to copy the original documentation (an apparently illegal endeavor but unlikely to be controlled)
- New upgraded operating systems, which require a completely new manual for its users (IBM recently upgraded from its 1.1 operating system to its version 2.0, requiring a completely new documentation manual).

TRAINING-RELATED FACTORS. Since the introduction of PCs and software, a totally new subindustry has been created: training. Despite the fact that most of the programs being developed today are user-friendly and allow first-time users to get started without much fanfare, developing the capabilities of any software package takes time and effort.

The more important aspect relating to training is fear of computers. To solve this problem, many organizations are running classes to teach executives VisiCalc, WordStar, Lotus 1-2-3, etc. More importantly for paper consumption, many companies have developed training manuals that allow users to develop skills at their own pace. Apparently nothing is safer and less threatening than a book alongside a computer to provide a means for overcoming fear.

Books. Computer books have attained a new class status in book stores because of two important developments. First, the insatiable desire of the American public to learn how to use these products has created a very hot category for book publishers. Second, these products are able to attract a premium price over and beyond what publishers can attempt to earn with other types of trade books.

Part of the reason that growth in published titles for computers has been nothing short of phenomenal is the segmentation in the marketplace. Titles are being created for every different computer and for every model of that computer. For example, books are available for Commodore's Vic 20, Pet, and 64. And within each of these segments are books on how to do different things on each model.

The need for this segmentation relates to the continual change in operating systems, which does not allow one generation of computers to be totally compatible with the next. The result: a completely new series of titles that must be created for its user universe.

Not only are there books on the computer, but there are endless numbers of titles on software packages. The use of a software package only creates more questions. A dedicated user of a piece of software will literally buy every book on the product to ensure getting everything possible out of that product.

Another reason for the success of these books relates to the desires of potential buyers to understand what they might be able to do with the program. Considering that a good PC software package can now cost between $300 and $700, a $15 investment is a small insurance policy.

Magazines. If you think a lot of books are available for computers, you should check the newsstands of New York City for magazine computer titles (among them is *Portable Computer*, put out by *Pulp & Paper*'s publisher, Miller Freeman Publications).

Magazines serve several distinct needs. They provide owners of a particular system (segmentation has also developed in the magazine market) with a monthly base of information on the capabilities and new products available for their system. Second, they provide reviews of new software packages and insights into how to make your current software even better than when you purchased it. For advertisers, these magazines supply the necessary pinpointed audiences for their new technological wares.

Needless to say, the magazine picture could follow one of two paths: further segmentation requiring new titles, or a shakeout, particularly when some of the secondary product marketers are forced out. Looking into 1984, there will likely be several books on the IBM PCjr by year's end.

Directories. If magazines and books were not enough, another completely new category of printed products

TABLE 4: **Major mail order marketers of paper consumables for the computer industry.**

Marketer*	**Location**
American Computer Supply	Dallas, Texas
Business & Institutional Furniture	Milwaukee, Wis.
Colwell Systems	Champaign, Ill.
Continental Resources Inc.	Bedford, Mass.
Caddylack Systems	Westbury, N.Y.
Data Control Supplies	Brooklyn, N.Y.
Devco Forms & Supplies	New York, N.Y.
Deluxe Computer Forms	St. Paul, Minn.
Delmart Co.	St. Paul, Minn.
Demco	Madison, Wis.
Devoke Data Products	Santa Ana, Calif.
Eimicke Associates	Yonkers, N.Y.
Global Computer Supplies	Hempstead, N.Y.
Inmac	Santa Ana, Calif.
Miles Kimball Book	Oshkosh, Wis.
Misco	Marlboro, N.J.
Moore Business Center	Wheeling, Ill.
Nebs Computer Forms	Townsend, Mass.
Pryor	Milwaukee, Wis.
Quill Corp.	Lincolnshire, Ill.
Sarend	New York, N.Y.
Stationery House Inc.	Hagerstown, Md.
Sorbus Service (MAI)	Frazer, Pa.
Source System	Addison, Ill.
UCI	Berwyn, Pa.
Visible Computer Supply	St. Charles, Ill.

*In addition to these specialty direct marketers, most hardware manufacturers and also numerous other companies (e.g., Sears Roebuck) sell paper consumables.

has also resulted from the growth in PCs and software. Specialized directories serve a distinct need in this marketplace—bringing together all of the hard facts on software and hardware into manageable information bases.

The most important of these directory categories relates to software—a category of products that has literally been exploding. Over the past two years, thousands of new software products have been developed that require potential users to have some common source for checking availability, capabilities, and system requirements. In some cases, these directories are now offered as subscription services since they are essentially outdated as soon as they are published. And in most cases they are quite voluminous—weighing over 10 lb and containing more than 1,000 pages.

To serve the consumer end of the marketplace, specialized directories have even been appearing on the magazine stands. They present segmented offerings on available products for specific PCs. In these cases, advertising tends to be an additional factor for the publisher.

Impact of PCs on packaging

In addition to the impact that PCs have on printing and writing papers, they have also had a significant effect on packaging.

Perhaps the most important development for packaging is caused by the need for creating an image of high value in practically any product or service sold throughout the expanding PC industry. And since most electronic products utilized with PCs require as much protection as possible, the use of cushioning materials is ever-present in almost every major product shipped significant distances.

Some of the more important developments relevant to key packaging materials and converted products used in this industry are:

- **Corrugated containers.** The traditional type of corrugated container is still the primary material for most computer products being shipped. Unlike many commodity markets, a walk through most computer wholesale warehouses will reveal an extraordinary amount of mottled white and bleached white liners.

  Additionally, for several of the lower-end products that might end up in mass market displays, there is quite extensive use of containers with preprinted liners or four-color lithographically produced labels. Unlike many other electronic products, boxes for computers and computer attachments must be saved by the consumer, particularly if the service is to be done through the mail or at a local dealer, thereby requiring a re-usable conveyance for safe transport between locations.
- **Protective packaging materials.** A variety of products are utilized by manufacturers in this market. The two most notable are foamed polystyrene forms and polystyrene beads. Many computers are also overwrapped in plastic bags and protected with corrugated end-posts.
- **Rigid boxes.** When Americans lowered their consumption of boxed candies, rigid box manufacturers were concerned. Today rigid boxes are being utilized for several products. Floppy disks are typically placed in a rigid type of box to ensure the necessary protection from bending. Most software manuals get placed into a rigid open-end box for easy-to-use storage and reference.
- **Pressure-sensitive labels** are a critical product for identifying the contents of a floppy diskette.
- **Binders** are the most commonly used holder for software and operating instruction data.

Online databases. Another area that will benefit from an increased population of PCs is online databases. In the U.S., more than an estimated 1,000 major online services are available to owners of PCs with modems, and many hundreds more are in the development stage. These databases range from the products of some of the best-known companies—Standard & Poors, Dun & Bradstreet, and so on—to those specialized databases on subjects such as metals, chemicals and, of course, paper.

To a large degree, the information generated from these databases will be printed, creating an additional demand on the paper supply as users of these services increase.

Advertising and sales promotion. Another aspect to PC growth relates to the impact upon advertising and sales promotion. From a papermaker's standpoint, advertising and sales promotion in a fast-growth industry means increased communications. And increased communications almost always means greater demand for paper.

As we have already seen, the phenomenal growth in PCs has created an overnight marketplace for magazine advertising—the most logical vehicle for reaching computer owners. However, in addition to the demands upon paper being created from magazines, many other forces increase paper consumption. These include:

Newspaper advertising. Needless to say, advertising for PCs was an unknown category ten years ago. Today it is taking up an increasing amount of newspaper display space as local retailers attempt to bring as many new customers to their stores as possible. A special computer-related classified section has even appeared weekly in the *New York Times*—possibly a bellwether for a new area of classified growth. And as computers grow in popularity, it appears very possible that a classified category for buying and selling systems and software might develop even to rival car or home sales.

Promotional literature. In light of the value placed upon these products, promotional literature represents a very important way to sell both hardware and software. And since producers of these products are trying to create the image of quality and higher value, they typically have not restricted their use of the most fancy coated sheets available for printing their promotion.

One has only to attend a computer or software trade show to understand the efforts that companies in this industry will take to promote their products. During the past year, IBM has sent owners of its PCs a fancy coated publication (60-lb paper) which catalogs all of the software products approved for its computer.

CONSUMABLES. The growth in consumables for use with the PC has represented one of the most attractive segments for paper consumption. Paper-related consumable items are available from a variety of sources. For those in offices within major cities, the traditional office supply wholesale system has geared up to this market and offers almost any product that is needed in high volume. However, for the home user as well as those in offices in some suburban and rural areas, the mail order catalog marketers have quickly jumped into this market to serve their growing needs.

Companies included in this list are those that have specialty catalogs for owners of computers. Quite obviously. IBM is one of these companies and therefore supports the contention that this is going to be a long-term attractive area for growth.

Prior to getting into any detailed discussion of types of paper consumables, it is important to point out that all of these catalogs are generating new demands for paper themselves. Typically printed on 40-lb coated No. 5, their paging, circulation, and frequency have been increasing each year. And they make optimal use of four-color printing.

A review of these catalogs will illustrate the range of paper products being sold to owners of personal computers. Some of these include:

Computer stock forms. A traditional product seen in the office for many years, computer stock forms will find increasing new applications in the home.

Micro-perf papers. These specialty papers permit a user to create correspondence on a form without letting the receiver know it was computer-generated. These papers are sold both blank and on printed stationery, utilizing both 20-lb bond and 25% rag content bond.

Business forms. The one area most likely to prosper from the PC explosion is business forms, particularly for billing applications relating to small businesses. Whether it be a collection notice, invoice or statement, standardized products are being created to organize the output of some of the more popular PC software packages on the market. Other applications that lend themselves to some of the more popular software packages include forms for acknowledgements, purchase orders, credits, price changes, and sales messages. Small companies and decentralized divisions of many of the larger companies will quickly come to recognize the speed that use of these products will permit in their handling of normal administrative duties.

Thermal paper. Over the next few years, a surge is likely in the demand for thermal paper. Many of the less expensive printers that will be introduced over the next few years will utilize the thermal print head design. Most notable in this category will be the introduction of a thermal-based printer for the IBM PCjr.

Continuous envelopes/labels. Small organizations that have had to resort to hand-addressing parties will likely look toward the PC as a means of eliminating this chore. Christmas card list management, which can take an incredible amount of time each year, might ultimately become a function of a good software package with the use of a decorative seasonal label. Nevertheless, applications for continuously produced envelopes and labels will grow as PC users creatively find new ways to eliminate administrative chores for their home, office, personal, and social activities.

IMPACT BY GRADES. Several grades of paper stand to prosper significantly if PC growth continues unabated over the next few years. A brief discussion of the grades that will prosper the most follows.

Coated No. 5. As the prime grade of paper utilized in most of the consumer and business magazines, coated No. 5 will enjoy the riches resulting from advances in circulation, paging, ad pages and new titles. These publications, most of which were not around five years ago, have created a need for some 150,000 tpy of coated No. 5 paper alone. To a somewhat lesser extent, some grades of uncoated groundwood and coated free sheet, which are used by the business trade press, will also prosper.

Forms bond. With the unprecedented growth in the printer population, forms bond paper producers will probably laugh all the way to the bank. More than likely, the average home computer owner will utilize just a handful of sheets per month. However, as the computer extends to more sophisticated applications revolving around work from the office, paper consumption should increase dramatically. (If your author is any example, in just ten months of PC ownership, I have gone through close to 30 lb of forms bond paper for applications relating to my office and personal writing assignments). However, the most promising force for producers of this grade of uncoated free sheet will revolve around the growth of PCs in small businesses—of which there are several million in the U.S.

Coated free sheet. Producers of this grade will also share in the PC explosion. Increased use of manuals and books and the need for top-quality promotional materials will be the primary forces affecting this grade in the near future. College and high school textbooks, an emerging area for computers, will likely be a fertile area of activity for this grade.

Uncoated book papers. The number of new titles will increase, and many will use uncoated book paper. As a large number of these books employ graphics along with the text, printers will likely utilize many grades that have found basic acceptance in the production of trade books.

Uncoated groundwood. With the explosion of directories and books to serve this industry, producers of uncoated groundwood papers will likely prosper too, but they will not prosper to the extent expected for other grades.

DEVELOPMENTS TO WATCH. Paper producers should monitor several critical developments that will take place over the next several years. These developments will more than likely have an important impact on the future demand for paper arising from PCs. The most critical of these include:

- Growth in the printer population, particularly as it relates to the personal and home computer
- Mix of printers being utilized for personal computing—daisy wheel, dot matrix, thermal, etc.
- Paper consumption trends on these printers
- Acceptance of specialty papers by consumers (like thermal or dielectric) for use of PC applications
- Use and acceptance of color printing with PCs
- Development of new software packages that could inspire the use of PCs to new segments of the population, creating distinct new needs for consumables
- Use of modems with PCs for the purpose of electronic mail
- Acceptance of videotex and teletext home communication services, particularly if the services are driven through PCs, and the resulting requirements for printers
- The competitive structure of the PC industry, which in the long run could limit the expansion of magazine and book growth should major participants be forced out
- The competitive structure of the software industry, which could also impact the use and type of media for promotional purposes
- IBM
- AT&T. ■

Caustic demand rising slowly but prices still down

By BARRY SHOCKETT

After a steady decline for three years, U.S. caustic consumption increased modestly in 1983 (between 1% and 2%). Both imports and exports were up as well—the latter rising more than 25%, while imports grew between 8% and 9%. The 1983 industry operating rate averaged 67.5% compared with 60.5% reported for the previous year.

The Canadian chloralkali scene was clouded somewhat when the western pulp and paper producers via the Pulp & Paper Industrial Relations Board closed about 20 mills at the beginning of February to force unions back to the bargaining table. At press time the lockout had idled almost 800 tpd of West Coast caustic capacity.

U.S. statistics for sodium hydroxide (000 short tons)

	1980	1981	1982	1983e
Capacity (estimate)	14,500	14.600	15,100	14,000
Production	11,625	10,414r	9,141r	9,450
Imports	132	246	396	430
Exports	1,413	1,330	810	1,025
Apparent consumption	10,344	9,330r	8,727r	8,855

r = revised. Source: Bureau of Census, U.S. Dept. of Commerce.

Canadian statistics for sodium hydroxide (000 short tons)

	1980	1981	1982	1983e
Capacity	1,806	1,818	1,850	1,850
Production	1,608	1,607	1,507	1,637
Imports	249	238	191	110
Exports	101.5	134.5	188	224
Apparent consumption	1,755.5	1,710.5	1,510	1,523
Pulp and paper	1,030	992	893	943

CAUSTIC SODA

UNITED STATES

Uses: Most of the sodium hydroxide (NaOH) consumed by the pulp and paper industry is purchased by kraft and bleached sulfite pulp mills, the major use being for caustic extraction.

Demand: The recovery from the 1982 recession last year resulted in an increase in caustic pulp mill consumption in 1983 to 1.8 million tons from the 1.7 million tons estimated in 1982. Production also increased in 1983 to about 9.5 million tons from the 9.1-million-ton level reported in 1982. Imports were up about 60% (to 396,000 tons), with about 56% originating in Canada.

Sources: Caustic is a coproduct of chlorine production. Chlorine producers are listed in the January 1984 issue of *Pulp & Paper*, p. 197.

Availability: Unlike its coproduct chlorine, a surplus of caustic soda built up during 1983 although signs at year-end indicated that demand was beginning to turn around. 1983, market; 1982, tight to market; 1981, very tight to tight; 1980, very tight; 1979, market; 1978, market.

Pricing: List prices continued to tumble for most of 1983 from $230-$240/ton (f.o.b. Gulf Coast) at the beginning of the year to about $150/ton by the end of the third quarter. The last decrease of about $80/ton brought lists prevailing in New Jersey and at Chicago terminals to $190/ton. Midwest tags dropped to $185/ton, while prices in California ranged from $220-$225/ton. Late in the year, however, three producers upped caustic lists by $10/ton, effective at the beginning of December for spot sales and January 1, 1984, for contract customers. Pricing history: 1983, $240-$160/ton (50% solution, f.o.b. works, freight equalized); 1982, $315/ton; 1981, $270-$320/ton; 1980, $167-$200/ton; 1979, $130-$160/ton; 1978, $160-$170/ton.

Forecast: It is expected that the turnaround in the pulp industry in 1983 will continue this year, albeit at a lower rate. Thus caustic demand by the mills could reach the 1981 level of 1.9 million tons in 1984. Market pulp output at the 10-month mark last year was at an annualized rate of about 6.5 million tons (more than 11% ahead of 1982). As the aluminum industry continues to improve—1983 production was an estimated 25% ahead of the previous year—caustic usage should increase in this area during the year. However, caustic inventories have reportedly not yet decreased enough to justify any price hikes in the immediate future. By mid-February, the $10/ton increase noted above was not being supported by all the producers.

CANADA

Uses: Pulp mills, which consume by far the largest share of the caustic soda produced, use sodium hydroxide for extraction stages in kraft bleach plants, for hypochlorite makeup, and in sulfite pulping.

Demand: In 1983, pulp mills consumed about 943,000 tons of caustic (62% of total demand), of which about 700,000 tons were used in bleaching. In 1982, 893,000 tons were employed by pulp mills overall, while bleaching uses made up about 663,000 tons.

Sources: Caustic is a coproduct of chlorine production and is made by ten firms in Canada. Producers are listed in *P&P*, January 1984, p. 197.

Availability: Although exports have increased by almost two-thirds from 1981-83, sufficient capacity is available to meet any domestic requirements. 1983, market; 1982, tight to market; 1981, very tight to tight; 1980, very tight; 1979, tight; 1978, tight.

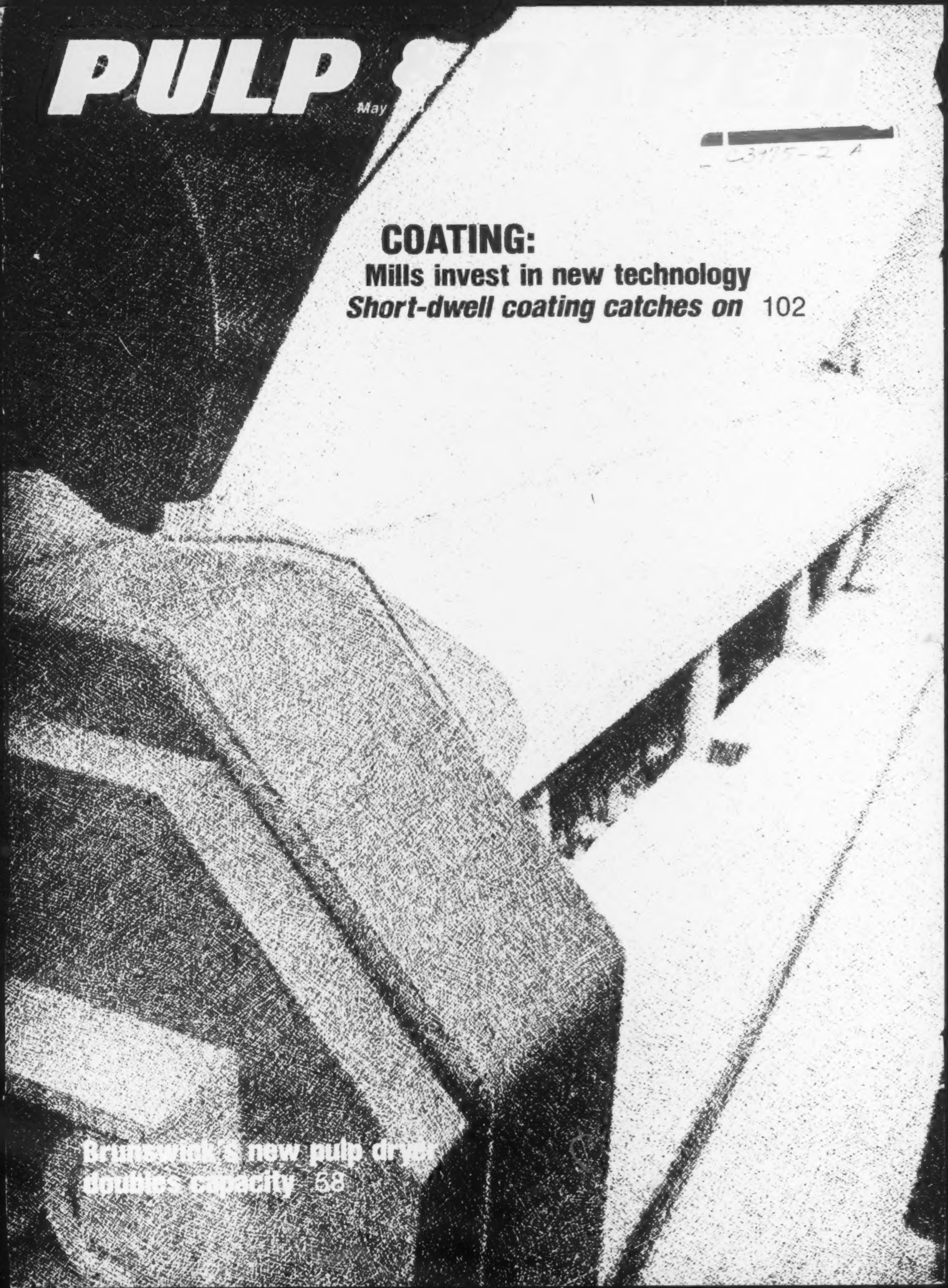
Pricing: Although chlorine prices were upped twice in 1983, caustic tags remained unchanged at C$417/ton. (The last price hike was on April 1, 1982.) Price history: 1983, C$417/ton (50% solution, f.o.b. works, freight equalized); 1982, C$381-C$417/ton; 1981, C$293-C$381/ton; 1980, C$195-C$293/ton; 1979, C$183-C$195/ton; 1978, C$175-C$183/ton.

Forecast: Discounts of up to 15% have been the norm for caustic tags over the past year or so. No list-price hikes are expected during the first half of 1984. If no long-lasting labor upheavals occur this year, caustic consumption by the mills could increase between 5% and 6%.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

PULP

May



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COATING:

Mills invest in new technology

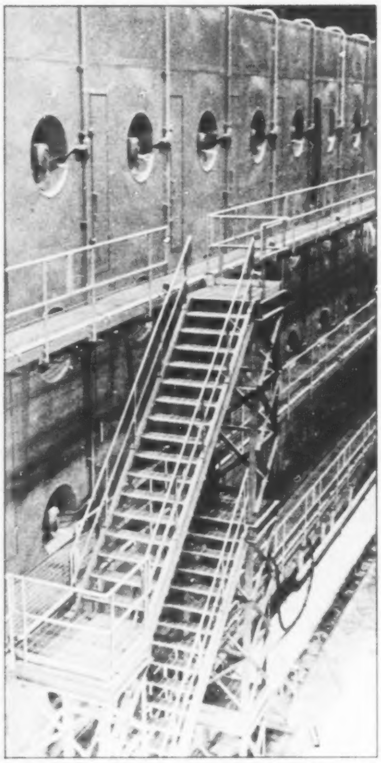
Short-dwell coating catches on 102

Brunswick's new pulp dryer doubles capacity 58

PULP&PAPER

Volume 58 Number 5 May 1984

"SHORT-DWELL" COATING 102



BRUNSWICK'S NEW PULP DRYER 58

COVER: *This issue's focus on coating includes an examination of the new "short-dwell" blade coaters. (Photo of Short Dwell blade coater courtesy of Beloit.)*

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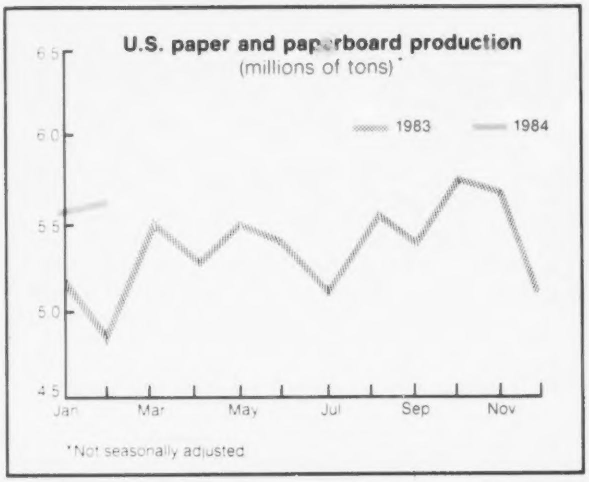
MONTH IN STATISTICS

U.S. paper and paperboard production continued very strong in February, totaling 5.6 million tons, up almost 15% from year-earlier levels, according to the American Paper Institute. The January-February two-month moving average of seasonally adjusted data stood at 67.6 million tons, a record for the period. Production was up 8.9% from last year's pace and up 7% compared to the old record set in January-February 1980.

Among major grades, printing and writing papers continued strong, with uncoated shipments up 17% from last year and coated shipments up 23.2%. Newsprint producers operated at record levels, with production up 8.4% from last February. The paperboard side of the industry also continued to show strength, with increases over last year in virtually every grade. Corrugated box shipments, at 21.98 billion ft², set a record for the month, up 18% from last year, said the Fibre Box Assn.

Canadian newsprint shipments totaled 6.5 million tons in February, up 6.3% from 1983, according to the Canadian Pulp & Paper Assn. Woodpulp exports, hurt by the industry-wide shutdown in British Columbia, were down an annualized 13.1%, with operating rates plummeting to 62%.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	February	452	8.4	5,470	5.9
Uncoated groundwood (s)	February	128	17.4	1,594	18.0
Coated paper (s)	February	509	23.2	6,137	17.7
Uncoated free sheet (s)	February	736	17.2	9,005	10.2
Unbleached kraft packaging and industrial (s)	February	322	4.9	3,833	0.2
Tissue	February	385	−1.3	4,745	3.0
Total paper	**February**	**2,813**	**18.0**	**34,125**	**9.1**
Kraft linerboard, unbleached	February	1,308	18.5	15,439	11.4
Semichemical medium	February	411	18.8	5,053	15.5
Bleached paperboard	February	340	11.1	3,968	5.0
Recycled paperboard	February	650	17.3	7,927	16.7
Total paperboard	**February**	**2.799**	**17.4**	**33,475**	**12.5**
Total paper and paperboard[5]	**February**	**5,611**	**14.9**	**67,600**	**10.8**
PULP, WASTEPAPER & FIBER [2]					
Total woodpulp production	January	4,371	2.9	52,457	4.6
Market pulp production	January	531	19.3	6,372	16.0
Wastepaper consumption at paper/board mills	January	1,292	9.8	15,504	8.4
Pulpwood consumption (cords)	January	7,185	n.a.	96,220	2.7
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	February	21.983	18.0	44.053[6]	14.1
Containerboard inventories at box plants	Feb. 1	2,404	−3.3		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	January	886	29.5	1,063	29.5
Imports of Canadian newsprint	January	650	20.4	7,802[6]	20.3
U.S. paper exports (including products)	January	341	−2.3	4,097	−2.2
Exports of unbleached kraft linerboard	February	152	−1.9	1,836	−9.5
Exports of woodpulp	January	260	11.1	3,115	11.0
CANADIAN STATISTICS [4] (reported in metric tons)					
Total newsprint shipments	February	646	6.3	1,345[6]	11.0
Operating rates	February	79%	84%	86%	82%
Inventories held by U.S. consumers	Feb. 29	1,249	−2.7		
Woodpulp shipments (export only)	February	473	−3.5	1,045[6]	13.1
Operating rates	February	62%	89%	77%	82%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Coated groundwood papers:
Mills will run full-out this year

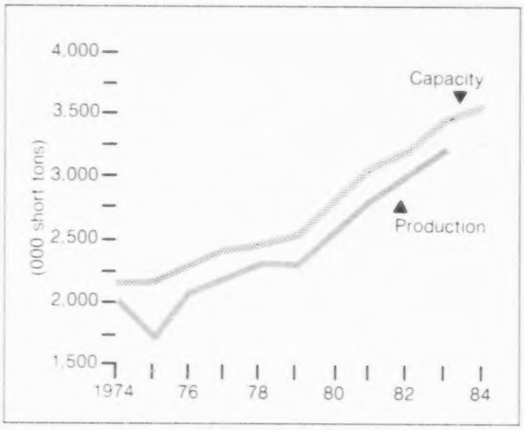
Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons[1]	2,902	3,193	3,454
Capacity, 000 tons[2]	3,242	3,452	3,598
Utilization rates, %	89.5	92.5	96.0
Imports, 000 tons	70	150	150
Exports, 000 tons	35	33	35
Apparent U.S. consumption			
000 tons	2,937	3,310	3,569
lb/capita	25.41	28.36	30.31
000 tons/$ billion real GNP (1972)	1.98	2.15	2.23

e = estimated 1. *Pulp & Paper* estimates 2. API capacity for coated groundwood papers—includes coated grades No. 3 and some of No. 4

GRADE STRUCTURE: Coated groundwood publication papers are made from furnish that includes at least 10% mechanical pulp, with the balance consisting of chemical pulp and fillers. All No. 5 coated paper and about 50% of all No. 4 coated fall into the groundwood category. No. 4 is distinguished by superior brightness and other appearance characteristics, while No. 5 is valued for runability and lighter basis weight. Coated groundwood basis weights are usually from 30 lb to 70 lb (25 × 38 in—500) although the most common range is 32 lb to 50 lb or 60 lb. End uses include magazines, catalogs, directories and other books, plus flyers, Sunday supplements and newspaper inserts. Coated groundwood may be printed by offset, letterpress or rotogravure methods. In the case of lightweight coated (LWC) paper, coat weight can constitute up to 30% of total sheet weight.

PRODUCTION/CAPACITY: Production shot up by 10% in 1983, surprising the industry and its customers alike after the 1982 performance when output rose just 3%. During the latter part of 1983, coated groundwood papers were put on allocation as the market fully absorbed new machines accounting for 543,000 tpy in capacity added in 1982 alone. No new machines are currently scheduled although several possible installations are under study, and capacity growth in 1984 and 1985 is expected to result solely from modernizations and from the continued progress of recently started machines up the learning curve.

OUTLOOK: Coated groundwood paper is in very tight supply and expected to remain so until 1987, barring a recession. The only apparent danger to this scenario would be if price increases in the next couple of years are so dramatic that the catalog, preprint and Sunday supplement markets—the major growth areas for coated groundwood in recent years—are partially driven back to uncoated paper. Assuming current conditions continue, operating rates this year are expected to average about 96%, with shipments rising by 8%.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. St. Regis	625	17.4
2. International Paper	450	12.5
3. Consolidated Papers	380	10.6
4. Boise Cascade	306	8.5
5. Mead	300	8.3
6. Crown Zellerbach	285	7.9
7. Blandin Paper	257	7.1
8. Midtec Paper	200	5.6
9. Pentair Industries	180	5.0
10. Weyerhaeuser	175	4.9
11. Great Northern Nekoosa	165	4.6
12. Fraser Paper	160	4.4
13. Bowater (Bowater Carolina)	124	3.4

U.S. capacity (1984): 3.598 million tons
Capacity share of top five companies: 57.3%
Capacity share of top ten companies: 87.8%

PRICES: Prices went the gamut from discounting in early 1983 to consecutive quarterly increases Oct. 1, 1983, and Jan. 1, 1984. Another increase this year is seen as a good possibility. Typical pricing trends ($/short ton for 34-lb roto paper) are: 1973, $285; 1974, $400; 1975, $385; 1976, $460; 1977, $500; 1978, $570; 1979, $637; 1980, $673; 1981, $735; 1982, $760; 1983, $730; 1984, $830. Offset prices average about $10/ton higher.

MARKETS: About 61% of No. 5 goes into magazines and another 18% into commercial printing, with catalogs and directories consuming a further 15%. Other end uses include books.

(News section continues on page 23)

LABOR

B.C. industry returns to work

British Columbia's two pulp and paper unions voted in mid-April to return to work after the provincial Labor Relations Board ruled that their 10-day-old strike was illegal. While no timetable was given, local unions were to make arrangements with the 20 affected mills for an orderly return to operations, according to Art Gruntman, Canadian Paperworkers Union regional vice president.

The CPU and the Pulp & Paper Workers of Canada struck on Mar. 30 as the industry, on orders from the provincial government, was preparing to end the lockout that had idled 20 mills since the beginning of February (*P&P*, Apr., p. 31). A subsequent government order that the unions return to work was ignored, with CPU and PPWC members voting 63% in favor of continuing the strike, reports indicate. The unions viewed the government intervention as interference with their collective bargaining rights, observers said.

The unions were not alone in opposing the government order to return to work. Employers were also reportedly against lifting the lockout, preferring that the bargaining "be left to run its course," said one observer. The industry, however, did not formally object to the government's intervention in the dispute.

The government has named Clark Gilmore, director of mediation services, to assist in the bargaining. Negotiations between the two pulp unions and the industry resumed on Apr. 4 but broke down less than a week later, reports indicate. In recent negotiations, both sides have refused to budge on the issue of the length of the contract. The CPU and the PPWC indicated they would settle for the three-year agreement the industry is seeking, but they want cost-of-living increase allowances included in the last two years—a stipulation the industry refuses to agree to.

Abitibi is first on CPU's agenda

Labor talks in eastern Canada began Apr. 2 when Abitibi-Price held a meeting with the Canadian Paperworkers Union. Most contracts were to expire in eastern Canada Apr. 30, and the CPU represents most of the workers involved.

CPU president James Buchanan said the union has not yet determined which company it will target. In the past, a settlement reached at a major company such as Abitibi, CIP or Consolidated-Bathurst, or the Eastern Canadian Newsprint Group, was used by the union as a model in negotiating other agreements in the region. The ECNG consists of Domtar, James Maclaren, Reed and Quebec North Shore.

Abitibi and the CPU were expected to exchange agendas, but bargaining was not expected to intensify until later in April, said Buchanan, who went on vacation Apr. 7-14.

The union was set to meet with CIP the week of Apr. 26, and dates were being set to convene with the ECNG later in April and with Consolidated-Bathurst early in May.

The CPU is not concentrating on wage increases this year as it did when contracts expired two years ago. Instead it is seeking a one-year agreement with job security, a shorter work week and improvements in benefits (*P&P*, Mar., p. 25).

Lockout tightens pulp markets

A number of factors have conspired to tighten pulp markets considerably in recent months, ranging from the labor dispute in British Columbia to better worldwide economic conditions to production cutbacks caused by record cold weather in the U.S. South.

These tighter markets encouraged a number of southern U.S. and eastern Canadian producers in early March to announce $50/metric-ton price increases for Apr. 1 in the domestic market, which followed a $40/ton price hike in the first quarter. The new prices are reported to be firm, which means that customers are being socked with a more-than-$90/ton price jump from discounted levels prevailing in the fourth quarter.

The latest increase brings the price of northern bleached softwood kraft tp $540/ton—within shouting distance of the $565 U.S. market peak that became partly established in the final quarter of 1981. Mills in British Columbia will probably not post price increases while labor negotiations are still underway, but they are expected to support market levels once the labor dispute in the province has ended and a contract has been signed.

The British Columbia shutdown resulted in the loss of about 9,500 metric tpd of potential chemical paper-grade market pulp production—or more than 665,000 tons during the ten weeks the pulp mills were idle. Even into the seventh week of the lockout, however, most pulp traders saw little sign of panic in the market, observers reported. Anticipating the shutdown and stronger world pulp demand, U.S. market pulp customers by the end of January had built up inventories of purchased chemical paper-grade pulp to a record level of 514,000 tons, according to the American Paper Institute.

North American and Scandinavian producer inventories of chemical paper-grade pulp tumbled 234,000 tons to 1.07 million tons at the end of February. The average operating rate for Norscan countries dropped to 77.9% in January from 92.2% in December, pulled down by a 52% rate in January for Canadian producers. All others ran above 91%.

Norscan producer pulp stocks plunged 416,000 metric tons in December due to customer inventory building and severe cold weather, which affected maintenance shutdowns of both integrated and market pulp mills, especially in the South.

North American/Scandinavian chemical paper-grade market pulp producer inventories
(000 metric tons)

Month	Total	Tonnage change from previous month	% change from previous month
February	1,059	−234	−17.8%
January	1,289	+86	6.8
December	1,207	−406	−26.0
November	1,630	+127	8.4
October	1,503	+37	1.9

Strike notice given in U.S. talks

Union workers in the U.S. Pacific Northwest may walk off the job, shutting down ten pulp and paper mills owned by three companies, following stike notice given Mar. 30 by the Assn. of Western Pulp & Paper Workers.

It was not clear whether talks were that close to breaking down, however. The two sides were described by observers as fairly far apart, but on Apr. 4 management gave a new proposal to the union, and Apr. 5 the AWPPW asked for a postponement in a meeting scheduled that day to allow more time to study the management offer—which could indicate the union felt the new offer was a sign of progress.

If there is a strike, many of the mills are expected to be run by supervisors, as occurred in the second half of 1978 when most of the U.S. West Coast industry was idled by a strike lasting roughly six months.

Areas of disagreement in current negotiations involve company "take-aways" in both health care and holidays, AWPPW president Farris Bryson said in late March before the strike authorization vote was taken. He said the proposal from the companies would raise health care deductibles and permit mills to run through such previously "restricted" holidays as Christmas and the Fourth of July.

- **Interstate Paper Corp.**, Riceboro, Ga., paid $192,000 in back wages to 211 hourly employees under a rollback/payback agreement worked out last year with the United Paperworkers International Union (*P&P*, June, p. 35).

The employees were repaid for a 7% wage reduction they voted to accept for a six-month period in 1983 to help Interstate during a difficult economic period. Interstate agreed to repay employees when financial conditions improved.

The agreement is believed to be the first of its kind in the pulp and paper industry. It covered the Jan. 31 to July 31 period, after which pay scales returned to previous levels.

U.S. Pacific Northwest mills involved in AWPPW negotiations

Mill	Product, capacity
Boise Cascade	
St. Helens, Ore.	725 tpd uncoated free sheet 100 tpd tissue
Vancouver, Wash.	285 tpd uncoated free sheet and carbonless
Wallula, Wash.	330 tpd market pulp 275 tpd medium 400 tpd uncoated free sheet
Georgia-Pacific	
Toledo, Ore.	1,130 tpd liner and medium 390 tpd kraft paper
Bellingham, Wash.	500 tpd pulp (some for market) 45 tpd paperboard 200 tpd tissue
Weyerhaeuser	
North Bend, Ore.	420 tpd medium
Springfield, Ore.	1,400 tpd liner
Cosmopolis, Wash.	450 tpd dissolving market pulp
Everett, Wash.	385 tpd market pulp
Longview, Wash.	150 tpd market pulp 565 tpd bleached board 280 tpd medium

FINANCE

Manville Forest to be reorganized

Manville Corp. said a federal bankruptcy judge gave final approval late in March to the reorganization of its Manville Forest Products Corp. subsidiary. The court's confirmation of the unit's plan allowed Manville Forest to emerge from Chapter 11 proceedings on Apr. 5.

The forest products unit filed a separate reorganization plan from Manville Corp. because its business operations and creditors are distinct from those of Manville Corp. The parent company filed for protection under Chapter 11 of the federal Bankruptcy Code to shield itself from potential future liabilities for asbestos-related health claims.

Unlike the reorganization plan of its parent, which has faced opposition, the reorganization plan for Manville Forest was not challenged. Manville Forest had sales of $426.9 million and income from operations of $53.2 million in 1983.

A company spokesman said that claims by general trade and utility creditors of Manville Forest Products Co. totaled about $15 to $16 million. As soon as possible, the company plans to begin paying off claims up to $10,000, plus interest, and hopes to have all claims paid by Jan. 31, 1985.

The emergence of Manville Forest from Chapter 11 is apparently unrelated to a plan that has been under study to reactivate three idle machines at the West Monroe, La., mill. The company has been talking to a number of containerboard producers and sales agents regarding a long-term contract to market output from the machines. A disagreement between Manville Forest and the local union over staffing levels for the machines has been resolved, the company said, and No. 1 machine will resume production on June 1.

The three machines, which were shut down in 1982, have a combined capacity of around 720 tpd. No. 1 machine had capacity to produce about 300 tpd of corrugating medium, while Nos. 2 and 4 produced about 420 tpd of clay-coated carrier board.

Lawrence files Chapter 11

Lawrence Paperboard Corp. and its subsidiaries, Harriman Paperboard Corp. and Lawrence Packaging Corp. on Mar. 15 filed Chapter 11 in U.S. Bankruptcy Court for the district of Massachusetts. Under Chapter 11, companies are protected from creditor action while given a chance to reorganize their affairs.

Lawrence Paperboard operates a 200-tpd clay-coated folding and setup boxboard mill at Lawrence, Mass., while Lawrence Packaging operates a folding carton plant at that site and Harriman runs a 250-tpd medium mill at Harriman, Tenn.

The two mills and converting plant, which employ 150 in Harriman and 350 in Lawrence, are continuing to run, and the filing is not expected to affect employment levels.

"The reorganization filing was necessitated by continued low prices due to excess industry capacity," according to Steven Marullo, an attorney with the Boston law firm of Marullo & Barnes. This caused cash flow problems, although the companies have recently begun to return to prof-

CAPITAL SPENDING

U.S. producers reveal ambitious plans

Rising operating rates and improving profitability are causing U.S. paper companies to step up their capital spending plans for 1984—and further strengthening is likely as the year progresses.

Paper companies now plan to boost outlays for new plant and equipment to a record $7.13 billion, up 15.4% from $6.18 billion in 1983 and higher than the previous peak of $6.80 billion set in 1980, according to the latest Commerce Dept. survey, conducted in January and February. The previous survey in November and December showed the industry was planning an 11.7% increase in 1984 spending.

The same pattern is being followed by all U.S. business, which is responding to the strong recovery by increasing capital spending. U.S. business now plans to increase spending 13.6% in 1984, up from a 9.9% increase reported in the last survey. Adjusted for a 1.4% estimated increase in the cost of capital goods this year, real spending is expected to rise more than 12.0%, according to the Commerce Dept.

Most major U.S. paper companies plan to either increase capital spending or hold it at relatively high levels, according to recent annual reports. International Paper Co., for example, plans to increase spending 6% to $785 million as it completes its Georgetown, S.C., mill modernization and begins restructuring its Mobile, Ala., facility. Union Camp, on the other hand, will reduce spending 21% to $325 million in 1984 with completion of its new Eastover, S.C., white paper mill in the fall.

More forest products-oriented companies such as Boise Cascade and Weyerhaeuser have begun to revive their capital spending programs. But one exception to the rule is Potlatch, which will hold its spending reins relatively tight at $55 million and concentrate on short-range, high-return capital projects. "Lack of fiscal discipline at the federal level and the difficulties it will create for the recovery" are cited for the company's conservative stance by chairman and CEO Richard B. Madden.

Capital spending plans of major North American paper companies
(millions of $)

U.S. companies	**1983**	**1982**	**% change 1983-82**
Boise Cascade	$300	$160	87.5%
Crown Zellerbach	300	252	19.1
Fort Howard	130	92	40.8
Hammermill	175	55	218.2
International Paper	785	738	6.3
Kimberly-Clark	350	363	3.6
Potlatch	55	54	1.5
St. Regis	200	102	96.6
Union Camp	325	411	−20.9
Weyerhaeuser	450	312	44.2
Canadian companies			
Abitibi-Price	C$140	C$165	−15.3
Domtar	150	108	39.3

Source: Recent company statements and annual reports.

EQUIPMENT

Valmet and Dominion plan joint venture

Valmet Corp. of Finland and Dominion Engineering Works of Canada last month announced the formation of a joint-venture company, Valmet-Dominion Inc., to manufacture and market paper machines in North America. Valmet will own 65% of the new firm, while Dominion's parent, Canadian General Electric, will retain a 35% stake. Other terms of the agreement were not disclosed. Valmet-Dominion will be located at the present Dominion facility in Lachine, Que.

The agreement has advantages for both parties. The Finnish firm gets its first manufacturing base in North America, as well as a Canadian marketing base. Dominion, which has seen its share of the paper machine market decline in recent years, should benefit from access to Valmet technology and a stronger presence in the U.S. market.

Even without a manufacturing base here, Valmet has done quite well in the North American paper machinery market. The company has sold 15 new machines in North America since 1970, accounting for 11% of new machine sales, according to a recent *P&P Project Report* survey. Six of those installations have included Valmet's Sym-Former twin-wire unit. New Valmet machines have gone mostly into newsprint and fine paper operations.

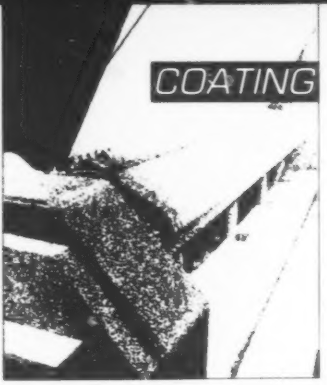
Over the same period, Dominion sold seven new machines. Dominion has concentrated on the Canadian newsprint makers, selling four of its new machines there—all twin-wire Papriformers.

Machinery shipments seen declining

Paper industry machinery manufacturers had a rough year in 1983, with shipments in constant-dollar terms down for the fourth straight year to their lowest level since 1972. And despite record production levels and high operating rates in many segments of the paper industry, machinery makers will have to wait until 1985 to benefit from the current economic upswing, according to the Dept. of Commerce's recently released *U.S. Industrial Outlook 1984*.

Due to long lead times and the reluctance of papermakers to commit themselves to capital improvements until a recovery is fully underway, recovery in the paper machinery sector traditionally lags a general upturn by a year or more, the Commerce report points out. Making matters worse for machinery suppliers, papermakers seem to be favoring less-costly rebuilds and incremental expansions over new installations more than in the past. Traditionally accounting for about 60% of capital spending, rebuilds may now account for as much as 70% of orders, the report says.

In constant 1972 dollars, U.S. manufacturers shipped approximately $397 million worth of paper machinery in 1983, down 4.0% from 1982. The Commerce Dept. expects shipments to decline again in 1984, dropping 1.8% to $387 million—a 22% decline from the 1979 high of $495 million. The drop-off will mask a pickup in shipments late in the year, however, as deliveries are made on orders received in 1983 and early 1984. New orders in early 1984 are expected to jump 10% from 1983 levels.



Coating, filler pigments: prices are steady but availability is tightening

Pulp & Paper's annual survey reports most prices stable in 1983, but shipments were up for anhydrous kaolin, TiO_2 and other pigments

By SUSAN S. TAYLOR, Staff Editor

■ The demand for coated paper in 1983 reached record levels as shipments rose 13.7% over 1982 to 5.72 million short tons vs 5.03 million short tons in 1982. Uncoated free-sheet grades have also rebounded from the depressed levels of the past two years. Shipments were up 10.6% to 8.68 million short tons. However, early 1984 reports show these grades losing ground. Shipments of coated boxboard and other grades consuming coating and filler pigments are generally up. The largest gains in production for the year were in printing/writing grades, up 11% from 1982 in response to improvements in business activity in general.

Kaolin production levels generally paced the rising production of these paper grades, up nearly 7% to an estimated 6.8 million short tons vs 6.36 short tons in 1982. However, kaolin consumption by the paper industry remained fairly static in 1983 compared with 1982 levels, at approximately 3.15 million short tons.

Demand for all pigments is forecast to be up in 1984. The paper industry has been on an upswing since spring 1983 and is expected to continue to improve through 1984. Continued growth of the industry could result in a 100,000- to 200,000-ton boost in consumption this year. Improvements in the housing and steel industry also increased demand for pigments in paint and coverings and for refractory clays. The U.S. Commerce Dept. reported housing starts at a seasonally adjusted rate of 1.67 million units in December 1983, a significant improvement over the 1.0-million-unit level of 1982.

KAOLIN CLAY. Kaolin clay on a tonnage basis is by far the major pigment used by the paper industry in coating and filler applications. Although industry demand was about the same as in 1982, some producers indicated that 1983 shipments were significantly higher. Contrary to last year, the improved economic situation and increased demand for pigments in other uses resulted in transaction prices very near list prices, although there is still some discounting for hydrous grades.

Kaolin prices in 1984 will probably be increased only moderately (5% to 6%), if at all. Some producers are predicting no price increases at all, with changes mostly reflecting the elimination of substantial discounting done in the past. One producer reported no discounting from list. Most producers are holding prices even though their costs have increased somewhat. However, the expected increase in volume should keep the kaolin industry's rate of return at more acceptable levels.

Since kaolin clays are produced in a variety of grades and a broad range of prices, it is difficult to analyze general trends in pricing and availability. For simplification, the clay market can be divided into three basic categories: premium clays (including anhydrous or calcined, high-brightness No. 1, and delaminated grades), commodity coating clays (Nos. 1, 2, and 3 clays), and filler grades (both water-washed and air-floated).

Anhydrous kaolin prices reportedly rose 9.6% to as much as $415/ton, following a modest 5.8% increase in 1983. This product's growing popularity as a replacement for titanium dioxide is reflected in this year's tight market situation compared with last year. According to one producer, "last year everyone was trying to generate business, but this year everyone is sold out." J.M. Huber Corp. started up a new calcined clay facility (its first venture into this market) in late 1983. The firm expects to be producing paper grades later this year. This, and plans by other producers to expand capacity, should ease the market situation for this grade somewhat.

On the other hand, the reported 12% to 13% overcapacity in the industry for most hydrous clays should keep them readily available through 1984. Prices for high brightness No. 1 grades increased about 5% although, as mentioned, not all producers raised list prices and actual transaction prices vary. Delaminated grades are in somewhat short supply according to some producers, but others report that the product is readily available, and prices in 1983 generally remained on par with 1982.

Commodity clays are reported to be readily available by most producers, although at least one supplier reports some tightness of supply. Prices are up in the range of approximately 6% to 8%. Producers of filler clays (both water-washed and air-floated) are reporting good supplies to meet the expected increase in demand, and prices remain very near the 1982 price levels.

TITANIUM DIOXIDE. Overall demand for titanium dioxide (TiO_2) was up 12% to 15% in 1983. Both rutile and anatase grades are in tight supply, reflecting the much improved protective coatings markets such as paint for houses and automobiles. The paper industry's market share of these pigments shifted downward slightly as the other industries improved. Paint accounts for more than 50% of dry anatase use. A tight balance of supply vs demand is predicted through the summer of this year, and there is already some controlled distribution for anatase. If the economy remains at current levels or improves by 5%, demand for anatase is predicted to exceed supply due to the loss of 100,000 tons of capacity (shutdowns of NL Chemicals and Gulf + Western Industries) in 1983. In fact, some spotty shortages of this product have already been reported. Imports are reported to be 20% lower than at this time last year, which will also tighten U.S. supply.

Considerable discounting is still occurring, although list prices have changed very little. However, most producers expect that discounting will taper off toward list prices, with transaction prices being at list by year-end. Most producers feel that transaction prices must improve from the current depressed levels to achieve a reasonable rate of return.

Inventory levels are very low, and the industry is currently operating at near 100% capacity.

CALCIUM CARBONATE. Calcium carbonate ($CaCO_3$) demand in 1983 was about the same as in 1982, according to most producers. Both ground grades and precipitated $CaCO_3$ are reported to be readily available. However, demand is projected by producers to rise quickly in this year due to increased demand for the product in alkaline papermaking. Several large paper machines reportedly running alkaline systems have recently come onstream. A significant increase in $CaCO_3$ demand for paint grades is also anticipated, reflecting continued improvements in the housing and automobile industries.

Paper industry demand for ultrafine ground calcium carbonate was reported to be up 50% in 1983, and an equal increase is expected in 1984. More than one producer plans to continue increasing capacity, although the industry still has some excess capacity.

PLASTIC, OTHER PIGMENTS. Plastic pigments used by the paper industry are reported to be in good supply, and prices are at the same level as the previous two years, remaining at $0.75/lb. PPG Industries Inc. has discontinued production of its Hi-Sil 404 extender pigment. Otherwise, silicas-silicates remain at about the same price level. However, supply is reported to be tightening.

The talc market has improved somewhat, and prices are up about 12%. A similar growth is predicted for 1984. Zinc oxide pigments (used in reproductive paper applications) are in adequate supply, with only a modest (5% to 8%) price increase predicted for the coming year. The use of photoconductive-grade zinc oxide pigments remains stable after decreasing over the past several years. Prices of hydrated alumina are up somewhat, with demand at about the same level as in 1982. Only insignificant (5%) price increases are expected.

Urea-formaldehyde and satin white pigments have been dropped from this year's survey. The major producer of urea-formaldehyde is currently reviewing its position in this market. The only major manufacturer of satin white reports that since sales of this product are miniscule and limited to one customer it should not be reported as a major industry pigment. ■

TABLE 1. **Prices and availability of commonly used pigments for coating and filler applications.**

	Availability[1]		Price quotations ($)[2]		Year-to-year increase (%)
	1983	1984	March '83	March '84	
Calcium carbonate					
Ground natural, medium ton dry	Market	Market	98-125	98-125[3]	0
Precipitated, bag, ton[4]	Market to tight	Market	155-218	160-218	1.3
Hydrated alumina, slurry, ton	Market	Market	365	439-460	23.2
Kaolin, clay, ton[5]					
Anhydrous kaolin	Market	Very tight	365	385-415	9.6
High brightness, No. 1	Market	Market	144-154	143-169	4.7
Delaminated, standard grades	Market	Tight	96-134	96-128	−2.7
No. 1 coating	Market	Market	88-107	88-118	5.6
No. 2 coating	Market	Market to tight	70-84	68-98	7.8
No. 3 coating	Market	Market	68-81	68-81	0
Filler,					
Water-washed	Market	Market to tight	51-66	49-63	−4.5
Air-floated	Market	Market to tight	31-40	31-46	8.5
Plastic pigments, lb	Market	Market	0.75	0.75	0
Silica-silicates, ton	Market	Tight	520-535[6]	485-560	0
Talc, bag, ton	Market	Market	169-189	170-230	11.7
Titanium dioxide					
Anatase, lb, dry	Market	Tight to very tight	0.69-0.73	0.69-0.70	−2.2
Anatase, lb, slurry	Market	Tight	0.69-0.70	0.69-0.70	0
Rutile, lb, dry	Market	Market to tight	0.75-0.77	0.75-0.77[7]	0
Zinc oxide, lb	Market	Market	0.5025	0.58-0.665	23.9

1. Availability terms are defined as follows: Very tight—on allocation or demand significantly higher than supply; Tight—demand slightly greater than supply; Market—supply and demand in balance or excess capacity available.
2. Prices are based on quotations for bulk f.o.b. plant shipments, except where noted, but do not necessarily represent the range in prices listed by all producers.
3. Higher quality ultrafine and fine-ground carbonate grades are available at $15-$25/ton more than the highest price.
4. Bulk shipments are $32-$45/ton lower.
5. Slurry shipments of kaolin clays are $6/ton lower on a dry basis. Shipment in 50-lb bags usually commands a premium of $22 over bulk prices.
6. 1982 prices.
7. Rutile slurry is generally available at $0.02-$0.05/lb less than quoted price.

PROCESS AUTOMATION

BENEFITS OF RECOVERY BOILER COMPUTER CONTROL SEEN AT 13 MILLS IN FINLAND

Computer control systems optimize sootblowing, saltcake reduction, fluegas O_2, and allow operation at or above rated capacities

By PERTTI VALKAMO and OSSI PANTSAR

■ A study was conducted in Finland from 1970 to 1973 by the Finnish Recovery Boiler Committee (composed of pulping industry representatives, boiler manufacturers, and Ekono) to find basic material for a recovery boiler computer control system.[1] The first control project as a result of this study was started in 1974 by Enso-Gutzeit Oy, Nokia Electronics, and the University of Oulu. The system that grew out of this project was put into operation in the beginning of 1976.[2-4] Today a total of 13 such systems are in operation in Finland.

Table 1 shows the boiler makes and types of control systems at these 13 mills. The increased capacities at Äänekoski, Kemi, and Pori were attained after modifications to the boilers themselves and/or to auxiliary equipment such as fans. Because several systems were installed on existing and often very old boilers, certain limitations were encountered, for example, in selecting air systems, airflow measurements, and controls.

Kaukopää No. 1 has a condensed system consisting principally of the airflow controls. The system on the Pietarsaari Babcock & Wilcox unit was completed during 1983, and the mill has only limited experience with its operation. Therefore, this system is not discussed in detail along with the 12 other projects.

Because specific benefits depend on a wide range of variables—which include required process changes, experience and expertise of mill staff and vendor personnel, in addition to the control system used—exact monetary savings due to boiler automation are difficult to define. This article, therefore, does not analyze the systems implemented at these mills from this perspective.

Reliable feasibility studies on the advantages of boiler automation are possible but generally require a series of mill trials and careful analysis and planning of any needed process changes. To maximize a mill's investment in boiler automation, it is strongly recommended that process changes, instrumentation, and the computer system be handled as a total package.

PROCESS CHANGES. The first Kaukopää control system was a pioneer project in Finland, and experience gained here was extended to subsequent systems installed at other mills, regardless of the boiler and computer system manufacture. Initially, it was suspected

TABLE 1: **Recovery boiler control systems in Finland in 1983.**

Mill	Company	Boiler	Capacity (tpd dry solids)	Control system	Delivery
Kaukopää	Enso-Gutzeit Oy	C-E/Ahlström (No. 3)	680	Afora[1]	1976
Veitsiluoto	Veitsiluoto Oy	Tampella	1,250	Measurex	1978
Kaukopää	Enso-Gutzeit Oy	C-E/Ahlström (No. 2)	680	Afora	1979
Äänekoski	Metsäliiton Teollisuus Oy	Ahlström	540[2]	Afora	1979
Kemi	Kemi Oy	Gotaverken	1,170[3]	Afora	1980
Kaukas	Oy Kaukas AB	SMV (C-E)	720	Measurex	1980
Kaukas	Oy Kaukas AB	Ahlström	450	Measurex	1980
Kaukopää	Enso-Gutzeit Oy	C-E/Ahlström (No. 1)	436	Afora	1980
Pori	Oy W. Resenlew AB	B&W	350[4]	Afora	1981
Rauma[5]	Rauma-Repola Oy	Tampella	1,050	Afora	1982
Pietarsaari	Oy Wilh. Schauman AB	Ahlström	1,300	Afora	1982
Tainionkoski	Enso-Gutzeit Oy	C-E/Ahlström	680	Afora	1982
Pietarsaari	Oy Wilh. Schauman AB	B&W/Ahlström	800	Afora	1983

1. Formerly Nokia Electronics. 2. Original capacity 420 metric tpd dry solids. 3. Original capacity 960 metric tpd dry solids. 4. Original capacity 280 metric tpd dry solids. 5. Na-bisulfite process.

Mr. Valkamo is energy manager and Mr. Pantsar is process engineer, Enso-Gutzeit Oy's Paper Div., Imatra, Finland. This is an updated article based on a presentation at the International Recovery of Chemicals in the Wood & Pulp Industry Conference, 1981. Printed with permission of TAPPI.

TABLE 2: **Sootblowing steam consumption before and after computer control and summary of required shutdowns for boiler cleaning.**

	Sootblowing steam (%)		Cleaning method and shutdown cycle
	Previous	Existing	
Kaukopää, C-E 3[1]	6	4.5	Occasional removal of salt block on the furnace arch
Veitsiluoto[1]	6	5	Water wash during programmed shutdowns
Kaukopää C-E 2[1]	6	5	Horizontal economizer washed after three weeks
Äänekoski	6	5	One extra water wash in addition to holidays
Kemi	8	4.7	Manual cleaning (periodically)
Kaukas, SMV[1]	6.5	5	One water wash saved annually
Kaukas, Ahlström	7.5	5	One water wash saved annually
Pori	7	6	Manual cleaning, interval 3 weeks
Rauma	4.8	3.4	Some manual cleaning, interval 2 months
Pietarsaari, Ahlström	4	3	Water wash, interval 1 to 1.5 years
Tainionkoski	6.5	3.5	Water wash, interval more than a year

[1] 10% overload.

that experiences gained with a Combustion Engineering boiler could not be applied to other boiler types. However, the essential characteristics seemed to be common for all types. Typical boiler features needed for implementation of the control method included:

- Stationary firing
- Plate-type nozzles
- Low primary airflow
- High secondary airflow
- Dimensions between primary and secondary air level of 40 in. to 60 in.
- Small number of liquor guns
- Large-size liquor guns.

At mills when these conditions do not exist—e.g., if the level of secondary air is too high—problems and future boiler modifications can be expected.

Stationary firing without oscillating liquor guns guarantees a stable furnace operation and decreases the carry-over of carbon. Also, liquor gun maintenance is relatively low with stationary firing. In some boilers, relocating the liquor guns was necessary.

Some of these process changes have been made without computerization on several recovery boilers. However, the effort to stabilize the furnace conditions has often led, or will eventually lead, to a control system investment in these cases.

Recovery boiler operating conditions at individual mills had significant differences. Some plants were not recovery boiler limited, and the benefit of increased production could not be accurately determined in the feasibility study. However, several recovery boilers are currently operating almost continuously above rated capacity, which was not the case before installation of the control system.

B&W boilers generally have a relatively high percentage of reduction. Therefore, the reduction improvements with these boilers amounted to only zero to one percent in B&W units, as was the case with both boilers at Kaukas. Excess air and fluegas loss could not be decreased in some recovery units.

SOOTBLOWING OPTIMIZATION. One of the most positive benefits has been a reduction in sootblowing steam. The sootblowers worked according to a fixed schedule or even continuously during the noncomputerized operation. Although savings vary considerably, generally the total benefit has been sufficient for a payback time of one to two years on the computer control investment.

The savings in sootblowing steam have been generally supported by a reduced number of shutdowns required for total water washing or manual cleaning of a clogged boiler. Additionally, some mills report the existing deposits to be easier to remove than before.

The basic strategy in sootblowing optimization is to control conditions in the furnace so that salt deposits are minimized and are not sticky. Installation of only the sootblowing control system—leaving the furnace control noncomputerized—has not been considered feasible in Finland.

Sootblowing steam is normally reported as a percentage of the generated steam, without taking into account the different enthalpies of sootblowing and main steam. A comparison of sootblowing steam consumptions before and after computer control can be easily made if all boilers are operated at their rated capacities. However, this comparison is difficult when boilers are operated in an "overload" condition. Table 2 summarizes sootblowing steam consumption and required shutdowns for boiler cleaning at the various mills.

A 2% to 2.5% savings in sootblowing steam was typical during the first years after the system startup on the Kaukopää Nos. 2 and 3 units. However, an effort to operate these boilers at 10% overload increased sootblowing steam consumption.

Clogging has not been a problem with the computerized recovery boilers. However, cleaning of the boilers is performed, at least occasionally, during repairs. The cleaning method depends on the structure of the specific boiler. The newer boilers with membrane walls are mostly water washed through the sootblowers. The older boilers with brickwork cannot be washed often and cleaning is therefore performed manually, either during shutdown or while oil firing.

Kaukopää No. 3 collects a salt block on the furnace arch near the one side wall. This is not harmful if the block is removed during shutdowns. Clogging initially occurred at Veitsiluoto, but replacing the secondary air system made extra shutdowns unnecessary.

Kaukopää No. 2 unit is furnished with a horizontal economizer that is impossible to keep open regardless of the sootblowing method. It must, therefore, be washed frequently.

Operation of the Ahlström boiler at Kaukas was improved when capacity of the secondary air system was increased. However, two more sootblowers for the lower boiler bank are needed.

Oy W. Rosenlew AB's mill unit at Pori has problems typical of an older boiler, and therefore the operating periods are very short. The low original rated capacity of this boiler must be considered when discussing its cleaning problems.

The C-E boiler at Tainionkoski was not furnished with new sootblowers in the rear generating tube section during the boiler modification as were the other Enso units. After boiler operation at higher loads using the new air system, it became immediately evident that the replacement of these blowers was absolutely necessary.

The parameters for a sootblowing control system have been discussed by Hoynalanmaa.[4]

Generally, lapsed time controls sootblowing in the superheater (and screen) section. Fluegas pressure drops very seldom reach their critical points in this area. In the boiler bank, fluegas pressure drops usually start sootblowing, but time lapses can do it also, at a low load. The economizer is blown according to the fluegas pressure drop or heat transfer coefficient.

Parameters that start the sootblowing can change, for example, according to the clogging situation in the boiler. Any changes in the setpoints or sootblower pressures have a certain influence upon the parameters. Exact information on the basis of the sootblowing parameters has, therefore, not much significance.

SALTCAKE REDUCTION. The percentage of sodium sulfate reduction has generally been increased in the computerized boilers. These gains, as shown in Table 3, were due to a combination of modifications to the process, basic boiler operations, and computer control.

The degree of modifications varied at the individual mills. If only the computer system was purchased, operating changes were relatively small. If, on the other hand, changes were made in the air and liquor systems, large alterations in air distribution were possible.

Computer control keeps conditions in the char bed stable, preventing the typical variation between shifts with manual operation. In two boilers, the air and black liquor systems were changed before computer control was implemented. These changes made the boiler operation worse and caused lower reduction percentages. In these cases, the existing computerized operation has been compared (in Table 2) with the original situation before the above alterations.

The comparisons for Veitsiluoto were difficult because the system was installed in a new boiler. The period without the computer control was short and consisted of the mill startup phase with numerous fluctuations.

If overflow from the fluegas or main dissolving tank scrubbers is led into the dissolving tank, apparent reduction of green liquor is decreased, and possible reduction improvements are difficult to justify.

DECREASE IN EXCESS AIR. Boiler trials are used to determine the optimum oxygen level in fluegas so that gas losses are minimized. The control system maintains this level and does not allow variations between the shifts. Decreases in fluegas O_2 are shown in Table 4.

FIGURE 1: **Fluegas Co + H_2 and CO vs O_2.**

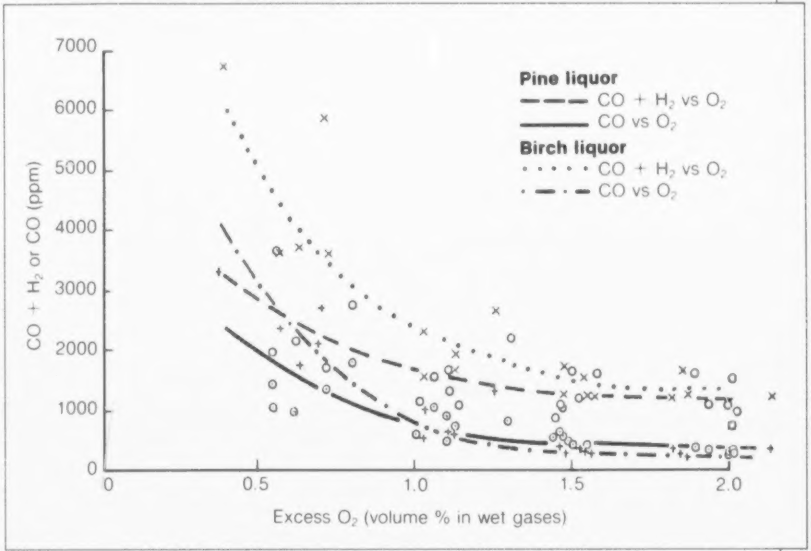


TABLE 3: **Percentage increase of sodium sulfate reduction.**

Kaukopää, C-E 3	4
Veitsiluoto	1
Kaukopää, C-E 2	4
Äänekoski	5
Kemi	1
Kaukas, SMV	—
Kaukas, Ahlström	—
Pori	1
Rauma	2
Pietarsaari, Ahlström	1.5
Tainionkoski	3.5

TABLE 4: **Percentage decrease in fluegas O_2.**

Kaukopää, C-E 3	0.5
Veitsiluoto	1
Kaukopää, C-E 2	0.5
Äänekoski	0.5
Kemi	0.5 to 1
Kaukas, SMV	1
Kaukas, Ahlström	1
Pori	1
Rauma	0.6
Pietarsaari, Ahlström	0.5
Tainionkoski	1

The boiler operation at Äänekoski was not normal before the basic changes in boiler operation. An addition of excess air was necessary to get the boiler to work in the best possible way.

The lowest O_2 reading reached, 1.5%, was reported from Rauma.

It is absolutely necessary to find the optimum situation in the trials before adjusting the computer to keep the variables at this point. If the optimum cannot be found, even manual control is better than computerized control because it does not keep the variables so rigidly at the poor setpoints.

Using the measurement of fluegas O_2 or CO for controlling excess air was analyzed in a recent article by D.F. Dyer and G. Mapels.[5] One of the Finnish boilers was thoroughly studied as a basis for a master of science thesis.[6] The author, as well as his instructors[7], came to the conclusion that CO cannot be used as a single loop variable in a recovery boiler if optimum efficiency is desired. However, it can be used to give useful information, especially during the disturbances.

Measurements have been completed with both birch and pine liquor at different black liquor flows and temperatures. In the optimum area for the Äänekoski boiler, the curve CO vs O_2 in Figure 1 is nearly horizontal and therefore inappropriate for airflow control. The hydrogen in the fluegas seems to have a substantial role in fuel losses and cannot be ignored

TABLE 5: **Basic instrumentation on the computerized recovery boilers.**

	Black liquor				Fluegas				
	Dry solids	Flow	Visc.	Furnace temp.	O_2	Dust	SO_2	CO	H_2O
Kaukopää, C-E 3	1	1		4	1	1	1		
Veitsiluoto	1	5	1	8	1	1	2		2
Kaukopää, C-E 2	1	1			1				
Äänekoski	1	1		4	2	1			
Kemi	1	1		4	2	1			
Kaukas, SMV	1	1		4	1	1	1	1	
Kaukas, Ahlström	1	1		4	1	1	1	1	
Pori	1	1		4	1	1			
Rauma	1	1		4	3	1	1		
Pietarsaari, Ahlström	2	5		4	2		1		
Tainionkoski	1	1		4	1	1			
Pietarsaari, B & W	1	3		4	2				

TABLE 6: **Typical instruments for recovery boiler control.**

Black liquor dry solids	EMC refractometer
Black liquor flow	Fischer & Porter magnetic meter
Furnace temperature	Gulton pyrometer
Fluegas dust	Sick opacity instrument

OTHER BENEFITS. Other benefits of recovery boiler automation have been widely discussed in several references.[2,6,8] However, many advantages cannot be meaningfully measured in monetary terms.

One benefit of significant value, but one which cannot be readily measured, is the potential increase in boiler capacity. Possibly some of the boilers at the 13 Finnish mills can be overloaded as much as 10% on an annual basis with the help of the computer system, process changes, and better know-how. However, because the need for extra boiler capacity varies from mill to mill, no data can be shown for this. However, it can be verified that production at the mills discussed is not limited at all by the recovery boilers.

The emission of H_2S at the mills with computer controlled recovery boilers is zero for all practical purposes. Also, SO_2 emissions are extremely low. This means some savings in makeup chemicals, depending on the initial situation and makeup added by the mill.

INSTRUMENTATION DETAILS. The extent of specialized instrumentation on boilers at the 13 Finnish mills varies widely. Instrumentation for measuring combustibles is provided for all of the boilers, and the Kaukas unit is equipped for CO_2 measurement. Table 5 shows the basic instrumentation in use on the various boilers.

Some interesting special problems have occurred with these instruments. Some refractometers have been disturbed by the carbohydrates present in birch liquor, causing an error in the reading. Soap in black liquor also causes an error in one refractometer's operation. Sometimes it has been possible to correct this error in the program.

Magnetic flowmeters are in generalvery reliable. However, they can be disturbed by gas bubbles generated in the indirect black liquor heaters, cascade evaporator, or liquor tanks.

Calibration problems were experienced with the pyrometers. The failure of these instruments was very common initially, before it was learned to install them behind a glass plate.

The gas sampling system of the analyzers may cause some trouble. The Zr_2 type of oxygen analyzers have no sampling system and are very suitable for the recovery boilers, although their ceramic filters seem to be slightly troublesome. At Rauma, a gamma ray instrument for dry solids content was found to be most suitable for that mill's liquor.

Earlier some mills had reported needing approximately one person for instrumentation maintenance for each recovery boiler. However, this estimate now seems to be slightly conservative for some of the mills.

Table 6 shows typical instruments and their suppliers for recovery boilers in Finland.

FUTURE BOILER CHANGES. One advantage of the computer control system has been the precise information it provides when changes to a boiler are necessary. Computer reports and other data can be used to determine the absolutely necessary modifications for increasing the capacity of a recovery unit. This helped Veitsiluoto modify its boiler, and was very useful at Kaukas for making several changes in the extension of its secondary air system.

At this time, no solution has been found to the Kaukopää No. 3 furnace arch salt collection problem, although the symmetry of secondary air is being studied very carefully. ■

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Top API officers welcome EPA administrator William D. Ruckelshaus *(third from left)* **on his return to the paper industry to deliver a luncheon address at the API annual meeting. From left are Louis F. Laun, president, API; Dr. Edwin A. Gee, API chairman and International Paper Co. chairman and CEO; and Albert F. Duval, API vice chairman and Hammermill Paper Co. chairman and CEO.**

High production levels continue into 1984, API Paper Week told

Most strength shown by printing and writing papers, containerboard and recycled board, with many grades pushing close to capacity levels

■ Production in the paper industry remained near capacity levels in February after running at a seasonally adjusted rate of better than 68.5 million tpy the preceding two months—equal to a 96% of total capacity, American Paper Institute president Louis F. Laun said at the start of Paper Week, Mar. 12-15, in New York City.

Nearly all major sectors of the primary industry strengthened, but the most remarkable advance was in printing/writing papers, containerboard, and recycled paperboard, Laun noted.

"If, as expected by most economic forecasters, business activity continues its upward trend throughout 1984, the demand for pulp, paper and paperboard is expected to continue strong," noted Laun. "Current rates of production, if sustained throughout the year, are high enough to yield a 6% increase in production, while the increase in capacity could permit some further expansion, particularly in white paper grades."

The marked improvement in the paper industry in recent months is expected to put upward pressure on capital expenditures also, Laun noted. Dept. of Commerce estimates paper and allied products industry capital expenditures of $6.9 billion on new plant and equipment in 1984, compared with less than $6 billion spent in 1982 and $6.7 billion in 1981.

WHITE PAPERS. Shipments of uncoated free-sheet paper by U.S. mills should rise by 4% to 5% this year from last year's already-healthy levels, API vice president James Hutchison told Paper Week delegates at the Waldorf-Astoria Hotel. The performance by coated paper mills could be more exciting, although an exact forecast may be more difficult to make. Hutchison noted that "when the actual shipment and production data are analyzed for the last five months of 1983, it appears that coated groundwood capacity for 1983 was slightly over 3.7 million tons, rather than the 3.452 million tons reported in the (API capacity) survey."

With coated groundwood mills making more paper than capacity surveys had indicated was possible, plus the "relatively soft demand in the first quarter of 1983," Hutchison said, "the amount of coated paper available for sale by U.S. mills in 1984 will be 8% over the amount shipped in 1983. Even if shipments only maintain the pace of the last five months of 1983, 1984 will be 6% over last year."

Capacity won't be rising as fast in the next two years as in the last five, however. No new coated machines have been announced, which means that "large blocks of new domestic capacity cannot reach the market before 1986." By contrast, coated groundwood capacity rose by 41% between 1978 and 1983—or 52%, if the higher-than-expected 1983 performance represents a more accurate capacity number—and coated free sheet was up 15% (see Table 1).

During that same period, several factors acted to push up coated paper demand—at a time when the U.S. GNP only rose by 7% for the whole five years. Among them are an increase in catalog paper demand by 11%/year, last year's "substantial improvement in magazine advertising lineage," the "penetration of coated papers in commercial printing," and the "desire of paper consumers to increase their inventories over the levels maintained in 1982."

Hutchison believes stocks have continued to rise among commercial printers and, to a lesser extent, among magazine publishers, "although the amounts to date have been geared more to keeping pace with sales rather than an overbuilding of stocks."

On the uncoated side, he noted that six machines will start up in the U.S. between now and 1987, a 15% rise in capacity. "As a result, the buyer should be willing to place orders closer to his needs rather than build inventory as he did a decade ago."

While that scenario is different from the recoveries of the 1970s, there are some similarities between 1983 and 1972, he said. "During 1983, uncoated free-sheet shipments plus net imports exceeded the trend relative to U.S. gross national product by 6%," he pointed out. "The amount above the trend line was quite similar to its performance in 1972," he added. Some of this jump came from inventory building, API believes, although mill inventories dropped by 50,000 tons last year.

Uncoated free-sheet mills have benefited from relatively slow capacity growth over the last five years, with total capacity going up just 17%. During that time, bond papers turned into a 1.98-million-ton market and forms bond into a 1.715-million-ton sector. "The growth in these grades came from increasing demand for office copying, word processing correspondence and computer output," he noted.

Another major uncoated free-sheet grade, offset papers, suffered from competition with coated in recent years "but experienced a substantial flow of demand in the fourth quarter of 1983, due in part to the tight coated paper supply/demand relationship," Hutchison noted.

MARKET PULP. The U.S. paper industry continues to rely on domestic and imported supplies of market pulp for about 12% of its total paper-grade pulp needs, despite recent industry acquisitions and integrated expansions, stated API vice president Ronald J. Slinn.

Although some analysts expect major structural changes on the demand side of the U.S. pulp market, these still have not appeared in API's statistics, Dr. Slinn said. Of the 4.8 million metric tons of chemical paper-grade market pulp delivered to U.S. consumers in 1983, U.S. producers shipped almost 48%, down from about 49.5% in 1982 but significantly higher than their share in each of the previous three years.

Pulp shipments to the U.S. market in 1983 were up 20% over 1982 and set a new all-time record, reflecting strong paper production, particularly for printing/writing paper grades. The proportion of market pulp to total U.S. white pulp consumption tends to rise significantly as the activity rate of the U.S. printing/writing paper sector moves into the lower 90% range, Dr. Slinn noted. White paper activity rates rose to just under 94% in the fourth quarter of 1983 and have picked up still further in the first two months of 1984.

"However, U.S. pulp consumers did not actually consume all of that increased volume of market pulp shipped to them last year," Dr. Slinn said. Consumers built up their purchased paper-grade pulp inventories by 85,000 metric tons during 1983 and added another 38,000 tons in January 1984. This brought inventories at the end of January to 514,000 tons—the highest level in recent memory, significantly above the previous high of 469,000 metric tons in December 1974 and 82% above the most recent low of 281,000 tons in February 1974.

Dr. Slinn said strengthening world pulp demand and the possibility of labor problems in British Columbia were behind the buildup in U.S. consumer pulp inventories. "The apprehensions were indeed warranted with the shutdown on Feb. 2 of some 51% of total Canadian chemical paper-grade market pulp capacity," he said. The dispute has resulted in the loss of about 9,500 tpd of potential market pulp production—more than 370,000 tons cumulatively not available for the world market.

Meanwhile, North American and Scandinavian producer inventories of chemical paper-grade market pulp plunged 416,000 metric tons in December due to customer inventory building and severe cold weather, which affected maintenance shutdowns of both integrated and market pulp mills, especially in the South.

A modest rebound in January inventories has been followed by another substantial drop of 234,000 tons in February to 1.07 million tons at the end of the month. The last two lows reached in Norscan producer inventories were in July 1974 (514,000 tons) and in December 1979 (614,000 tons), Dr. Slinn noted.

"Should the labor dispute in British Columbia fail to find an early solution, we could soon see the testing of a new lower physical limit to producer inventories," Dr. Slinn said. Simple extrapolation from the two previous lows would suggest 714,000 metric tons based on growth in the world pulp market and level of market pulp inventories which producers now need to keep larger pipelines filled.

TABLE 1: **U.S. coated paper expansion vs growth in real GNP, 1978-83 (000 tons).**

	1978	1983	% change 1978-83
Coated groundwood	2,450	3,452	41%
Coated free sheet	2,096	2,402	15
Total	**4,546**	**5,854**	**29**
U.S. real GNP (billions of 1972 $)	1,439	1,535	7

Source: API.

P&G leads in API annual safety awards

API presented its Annual Safety Awards to three companies in recognition of their outstanding safety performances. The awards were won by Procter & Gamble Paper Products (which won three awards), International Paper, and Boise Cascade.

Winners are those companies that have had the lowest accident and injury safety records over the past five years and experienced no fatalities or permanent disabilities. Incidence rate takes into account the total number of occupational injuries and illnesses relative to total workhours.

P & G achieved a five-year cumulative rate of 2.71 for the period Jan. 1, 1979 to Dec. 31, 1983 among mills operating 2.5 million or more workhours annually. IP registered a cumulative total incidence rate of 3.34 at its Texarkana, Texas, mill during the five-year period for mills operating 1.5 to 2.5 million workhours annually.

P & G's East River River mill in Green Bay, Wis., for the second consecutive year, won the award for its mill which registered a cumulative five-year total rate of 4.55 for mills with 1.0 to 1.5 million workhours annually. P & G's Cheboygan, Mich., mill won with a 2.54 rate in the 500,000 to 1.0 million workhours annually category. Boise Cascade's Latex mill at Beaver Falls, N.Y., was the winner for the second year in a row in the fewer than 500,000 workhours category with an incidence rate of 3.85.

If the "curiously consistent interval" of about two years and nine months between peaks and valleys occurs, this new trough in Norscan producer inventories would occur in May of 1985, Dr. Slinn said. If there is indeed another 15-month wait before the next trough, the curve for inventories this cycle would not be V-shaped but "more like the flat floor of a wide valley."

Federal reports on Japanese industry

The objectives of a U.S. delegation that traveled to Japan to discuss the two countries' paper industries were met for the most part, said John R. Kennedy, president of Federal Paper Board Co., at API's Paper Week, Mar. 12-15.

Kennedy and ten other paper industry executives, as well as representatives from API and the U.S. government, attended meetings in Toyko with 19 Japanese paper industry executives, representatives from the Japan Paper Assn., and the Japanese government Feb. 14-16. The sessions, arranged at the invitation of the Japanese industry, dealt with topics of concern to both countries.

The agenda—agreed upon prior to the start of the meetings—included the following subjects: the pulp and paper industry and its future developments; availability of resources; structure of the industry; the industry's approach to trade; and its approach to government relations. The only part of the meetings not arranged in advance was the questions, said Kennedy.

"The discussions were frank but friendly, and, as can be expected, the only truly controversial points arose in a discussion of the U.S. and Japanese papers on trade," he noted.

Key objectives of the U.S. delegation were determined in advance and approved by the executive committee of API, said Kennedy. Generally, the objectives were met, although the Japanese continued to defend their policies on trade.

While the U.S. executives sought to convince the Japanese that their tariff and nontariff barriers make it too difficult for the U.S. to compete in Japan, the Japanese maintain that their tariffs are not overly restrictive and that U.S. companies must learn the requirements of the Japanese market and how to operate within their distribution system, said Kennedy.

The U.S. delegation sought to convince the Japanese that the U.S. industry is not attempting to dominate the Japanese market but is seeking a "reasonable increase in our share of their market," said Kennedy. Asked what U.S. executives considered a "reasonable share," U.S. delegates indicated that it would be determined by "market forces" if trade barriers were eliminated.

U.S. executives were concerned about the Japanese Depressed Industry Law, feeling that some inefficient facilities might be protected. The legislation funds capital improvement in the Japanese industry. The Japanese argued that imports increased in recent years—a time when their industry was operating below capacity. Kennedy felt the Japanese arguments were weaker than the U.S.'s position where the two sides disagreed. "Logic and reason is on our side," he said. He noted that one member of the Japanese delegation in a "rather outspoken and unplanned comment" implied that the Japanese industry needs barriers to survive.

"I think this is clearly the key issue," said Kennedy. "The Japanese feel that the cost advantage U.S. producers enjoy is so basic they cannot compete and therefore will lose their markets unless they are in some way protected." Kennedy noted that 40% of Japan's pulp production is based on imported pulpwood.

Both sides agreed, however, that the meetings were a success, said Kennedy. "It was an initial and vital step in the process of opening a large and important market to the U.S. industry. It will not come easy; it will take hard work and time, but the rewards can be great," he noted.

Dr. Slinn suggested that pulp consumers might soon begin to expect shipment delays. Helping to ease the supply situation, however, will be the 1.2 million metric tons of chemical paper-grade market pulp capacity scheduled to be added to world supplies between 1983 and 1986, of which more than half will be built in the U.S. This will increase the U.S. share to 20% of the projected world capacity in 1986 of 28.5 million metric tons, up from 18% in 1983.

SOUTH AMERICAN CHALLENGE. South America is already competitive with the U.S. in hardwood fiber and is growing huge amounts of conifer, according to Bruce Zobel, professor emeritus at North Carolina State University's School of Forest Resources. But because of lower quality, serious competition from South American softwood fiber may be 20 to 25 years away, until trees are further genetically improved.

Zobel said the main potential for timber production in South America is not in the jungles or Andean region, but in large plantations established on savannahs and grasslands. Planting and harvesting on such grasslands, stretching for millions of acres, can be done at low cost. Zobel showed slides of uniform trees in a Brazilian eucalyptus plantation which had reached a height of about 100 ft in seven years and were ready for harvesting.

BLEACHED PAPERBOARD. Overcapacity could easily drag down the solid bleached sulfate paperboard market after 1985 if the industry adds any more machines other than one planned by Westvaco Corp. forest products analyst Thomas Clephane of Morgan Stanley warned paper executives during a session at API's Paper Week.

If capacity is increased by only the 175,000 tons Westvaco is slated to bring online in 1986, bleached board industry operating rates should reach 98.6% in 1985 and 97.4% in 1987. This year, mills should run at 97.3%, up from 95.6% last year and 88.9% in 1982, according to Clephane's estimates. He noted that a major factor in the industry's high operating rates last year was a 3.9% decline in capacity during 1979-83.

SBS markets should be tight during the next two years, said Clephane, with capacity expected to increase just less than 3%. Demand, however, should not improve very much for most end uses. The biggest potential for growth will be in aseptic packaging and ovenable paperboard, he noted (see Table 2).

Aseptic packaging is still in its infancy in the U.S., and producers of bleached board for aseptic packaging should note that Swedish producers have the best technology in that market. Billerud is also planning a 200,000-ton expansion by 1986, and part of that tonnage will be directed to the U.S. market, said Clephane.

Aseptic packaging and ovenable paperboard consumption is expected to rise by 26% to 100,000 tons by 1987, compared to 40,000 tons last year, Morgan Stanley figures show. But just 15,000 to 30,000 tons of that growth will be in ovenable board.

Clephane's projections for the next three years also indicate some growth in export markets (3.5%) and an "other" uses category which includes record jackets and blister packaging (4.5%). Demand for milk carton, folding carton, and cup and plate stock will remain relatively flat during the next three years.

Flat for the past four years, prospects for the folding carton market itself don't appear promising. In addition, SBS producers may continue to lose market share to clay-coated and uncoated kraft paperboard, said Clephane. He said about half of Procter & Gamble Paper Products Co.'s Pampers disposable diapers and all of Kimberly-Clark Corp.'s Huggies line are being boxed in clay-coated board.

Domestic milk carton consumption was up 1.9% last year, but this does not reverse the decline of the past several years, said Clephane. The industry has tried to increase milk carton usage through a campaign alerting consumers to the nutritional advantages of paperboard containers. It succeeded in increasing milk carton sales in cities tested last year, the Paperboard Packaging Council said.

Except for aseptic packaging—and, to some extent, ovenable board—the bleached board industry is mature and is expected to grow at a rate lower than the GNP, said Clephane. Production is expected to reach 4.23 million tons by 1987, up less than 8% from 1983's total of 3.92 million tons.

WASTEPAPER DEMAND. Long-term demand for secondary fiber will surpass forecasts for the year 2000 if consumption continues to grow at its present pace, stated J. Rodney Edwards, API vice president-paperboard.

In the first eight weeks of 1984, wastepaper utilization at domestic recycling mills was up 10% from the same period last year, he noted. At that rate, wastepaper collections could total over 20 million tons by year-end, a new record. Last year, a record 18.6 million tons of paper stock was collected for recycling. Domestic consumption reached 16 million tons and exports totaled 2.6 million tons (see Table 3).

Greater utilization of recycled fiber at U.S. linerboard and corrugating medium mills was responsible for a 700,000-ton increase in consumption of corrugated containers to 8.3 million tons, noted Edwards. Exports totaled 993,000 tons. Domestic utilization of old newspapers was down slightly to 3.4 million tons due to a drop in demand from the nation's deinked newsprint mills. Exports, though, rose by 20,000 tons. Demand for mixed papers and pulp substitutes was up last year. Mixed papers consumption increased by 300,000 tons to 2.5 million tons, and pulp substitutes demand rose by 500,000 tons to 4.2 million tons, Edwards said.

H.C. Bowen Smith, of Salomon Brothers Inc., underscored the concern about possible future shortages of secondary fiber, stressing shrinking sources of primary fibers. Smith cited several factors which could put pressure on fiber supplies before the year 2000 and cautioned mills to be prepared to pay more for their furnishes and to seek alternative sources—especially secondary fiber supplies—in order to reduce future cost increases.

Smith expects that the growth in waferboard and oriented strand board will continue to absorb increasing amounts of the chip supply, especially in the South and Pacific Northwest.

This will cause greater competition for softwood supplies in the South, where most of the land is held by individual timber owners, a good portion of whom have allowed replanting to lag harvesting—only one or two acres in seven are replanted. By the 1990s, noted Smith, the South could have a severe softwood shortage.

Historically, use of wastepaper has trailed the growth of paper and board consumption. During the past 20 years, paper and board demand rose 55%, but only 5% of the additional fiber requirements came from secondary fiber, Smith said. The recovery rate for wastepaper, however, has increased 22% over the past ten years, helped by a 275% increase in wastepaper exports.

Another factor which will affect fiber supplies in the future is increasing demand from Canada, Mexico, and the Pacific Rim countries. Exports of wastepaper have risen rapidly and boosted prices on both coasts of the U.S. This will continue to increase fiber costs for domestic mills in those regions, noted Smith.

Rising fiber costs may affect the future viability of recycled board mills, which are also vulnerable to rising purchased energy costs. Some recycled board mills have recently been installing onsite cogeneration to reduce their energy costs.

More competition for secondary fiber is coming from containerboard mills, which have been using more wastepaper in recent years due to improvements in repulping technologies. In 1983, recycled corrugating medium output increased twice as much as semichemical production from last year. Smith noted that linerboard mills now use up to 20% of hardwoods and wastepaper in their furnishes compared to 5% to 7% a few years ago.

(Continued on page 123)

TABLE 2: **Projected U.S. bleached board growth rates by end use markets (000 tons).**

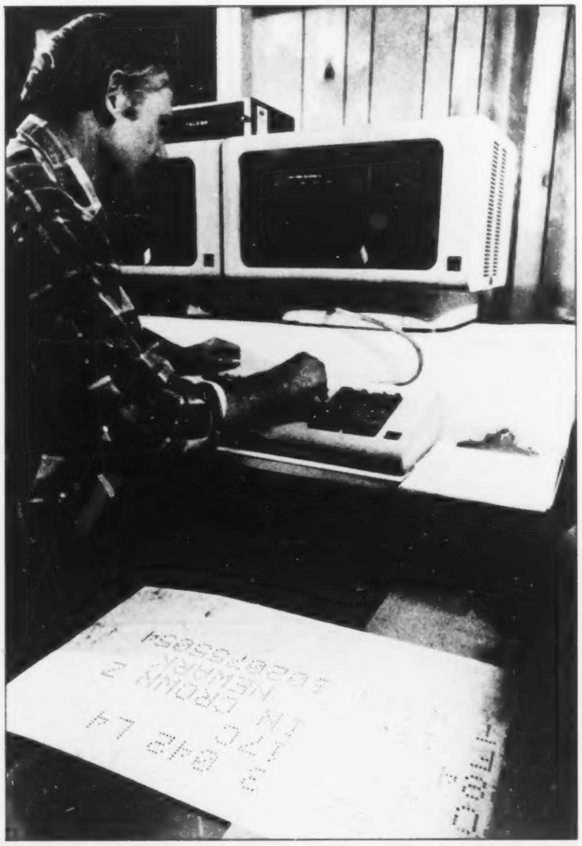
	1983	**1987**	**Projected average annual growth rate 1983-87**
Domestic milk cartons	602	602	0.0%
Folding cartons	1,719	1,825	1.5
Cup and plate	703	703	0.0
Export	516	592	3.5
Other	338	403	4.5
Aseptic and ovenable	40	100	26.0
Total	**3,918**	**4,225**	**1.9**

Source: Morgan Stanley Research estimates.

TABLE 3: **U.S. wastepaper consumption, exports and collections, 1983-82 (000 tons).**

	Consumption at U.S. mills[1]	**Exports**	**Total collected**
1983			
News	2,952	461	3,414
Corrugated	7,349	993	8,343
Mixed	1,823	705	2,527
High-grade deinking and pulp substitutes	3,826	414	4,240
Other	44	—	44
Total	**15,994**	**2,574**	**18,568**
1982			
News	2,974	439	3,413
Corrugated	6,770	887	7,657
Mixed	1,707	497	2,204
High-grade deinking and pulp substitutes	3,437	304	3,742
Other	34	—	34
Total	**14,923**	**2,127**	**17,050**

[1] Includes consumption at plants making molded pulp and insulation products. Source: API.



Interfaced with the mill's host computer, each automatic Stencil Punch machine produces one stencil every 20 to 25 sec—two to three times faster than the manual rate.

consists of the roll number, directional arrow for unwinding, lineal footage, weight, production date, customer name, order number, and destination. On product for export, standard data are expanded to list the customer's name, mill order number, a "made in U.S.A." tag, and a "use no hooks" warning. Optional variable information includes metric measurements, consignee, shipping data, and applicable customs information.

MACHINE FITS SMOOTHLY. According to Georgia Kraft, the two automated stencil machines were incorporated with no special modifications in the mill's data systems. Since the devices cut stencils for everything the mill makes, roll size and weight data received by the host computer goes directly to the stencil cutter. This provides more complete, accurate production records for inventory control, shipping, and customer service. The two automatic units now produce stencils at the rate of one every 20 to 25 sec, two to three times faster than the previous manual rate of 1/min.

The original system considerably burdened workers at the end of production lines, according to the mill. It was difficult to keep manual stenciling activities in step with production. Now that employees at roll scale stations no longer manually cut stencils, everything—except applying spray paint to stencils—is done automatically, and worker productivity is noticeably higher.

Due to its success with automatic stenciling at Rome, Georgia Kraft has ordered two more units (with a third in reserve) for scales at the end of two Macon lines. ■

HIGH PRODUCTION LEVELS CONTINUE

(Continued from page 121)

"Unless paper companies devise a strategy to deal with the changes that are affecting their fiber supply, some facilities will be paying substantially more for fiber than their competitors," he noted.

Countries in the European Economic Community will also be competing for secondary fiber supplies in the future, said Albert De Monts of the European Confederation of Pulp, Paper Board Industries (CEPAC), in another speech given during Paper Week.

The use of wastepaper in newsprint mills has reached over 40% and is expected to continue to increase—though slightly—reaching as much as 800,000 metric tons within the next few years, De Monts said. During the past few years, paper stock imports to the European Economic Community have risen between 200,000 and 500,000 tpy, less than 5% of total consumption in that region.

TISSUE. Tissue manufacturers will have to look hard at fiber costs in the coming years if they want to maintain a competitive position, consultant Fred D. Iannazzi said at another session. A major force affecting the tissue industry's cost position in the next five years will be the cost of secondary fiber, which Iannazzi believes "is likely to increase substantially."

In order to restrain secondary fiber cost increases, Iannazzi believes "a collective, industry-wide effort is needed to promote programs for source segregation of office waste and the development of mechanical separation of mixed office waste."

Iannazzi indicated another possible approach would be to use chemimechanical pulp as an alternative to chemical pulp. CMP mills are far less expensive to build than chemical pulping facilities, he noted. And while "some tissue mills are not near a sufficient supply of pulpwood to support onsite pulping, the much smaller economic scale of operation and the higher pulp yield associated with CMP reduce the necessary quantity of wood to only a fraction of that for a chemical pulp mill," Iannazzi added.

Other fiber alternatives should be examined by tissue producers because wastepaper demand will rise rapidly over the 1982-86 period, driving up prices. While domestic wastepaper recycling capacity will rise at a 4.4%/year rate, U.S. exports of wastepaper will shoot up at a 17%/year rate, Iannazzi indicated to the conference attendees.

The increasing dependence of tissue mills on wastepaper supplies was shown by Iannazzi's estimate that recycled fiber represented 28% of tissue fiber furnish in 1975 and 39.4% in 1982—but "should reach 50% within the next five years." Mills are adding deinking capacity at a 4.2%/year rate, while tissue demand went up only 1.7%/year over the last decade.

(Fred D. Iannazzi is president of Andover International Associates, a new firm specializing in management consulting for the forest products industry. Andover International Associates will be presenting one-day executive seminars with *Pulp & Paper* and *Pulp & Paper International* in New York, N.Y., Montreal, Que., and Vancouver, B.C., in May and June 1984 on the North American industry's world competitive position in the 1980s.) ■

Japanese pulp and paper industry struggles against import threat

Faced with an unusual reversal of roles, industry in Japan is considering ways to produce cheaper paper products to combat rising imports

By RICHARD S. THORN

■ In recent years the U.S. pulp and paper industry has made strong inroads into the Japanese market despite a relatively weak growth in Japanese demand for paper products. This has resulted in an unusual reversal of customary roles, with the Japanese industry calling for special help to overcome the threat of imports. Despite sluggish paper production in Japan, the volume of imported paper has been rising, posting an increase of 29% in 1982. This has produced an average annual growth of 16.9% for the past five years.

The ratio of imported paper to total Japanese consumption is currently still small, ranging only between 2% and 4% of total domestic consumption. However, the import of newsprint and kraft linerboard, which represented 70% of 1982 imports in volume, accounted for 8.9% of newsprint and 14.5% of kraft linerboard consumed in Japan.

An overwhelming majority of Japan's imported newsprint is shipped by the North Pacific Paper Corp. (Norpac), a U.S.-based joint venture of Jujo Paper Co. of Japan and Weyerhaeuser Co. of the U.S. It is significant that newsprint produced overseas, although regarded as inferior to the domestic product, has been accepted in the Japanese market. Encouraged by the success of Norpac, other overseas papermakers are now planning to enter the Japanese market.

In Japan, there is some apprehension about the stability of imported newsprint supply, particularly in view of the huge Japanese consumption of several thousand tons daily. Another problem is price instability caused by fluctuations of the exchange rate. A third disadvantage of imported newsprint is the high incidence of tear (about four to five times higher than that of the domestic product). Some overseas producers are moving to secure storage facilities in Japan to ensure a stable supply. However, due largely to the quality problem, they have not been successful in gaining long-term supply contracts. The cost advantage of imported newsprint, nevertheless, is having a significant impact on domestic newsprint manufacturers who have, so far, dominated the market.

Nearly 60% of Japan's imported kraft linerboard in

Company	Paper, paperboard output	Share (%)	Paper output	Share (%)	Paperboard output	Share (%)
Oji Paper	1,739	10.0	1,707	16.5	32	0.5
Daishowa Paper Manufacturing	1,298	7.4	926	8.9	372	5.2
Jujo Paper	1,177	6.7	1,177	11.4	0	0
Taio Paper Manufacturing	1,084	6.2	854	8.3	230	3.2
Honshu Paper	765	4.4	290	2.8	475	6.7
Sanyo-Kokusaku Pulp	611	3.5	600	5.8	11	0.2
Kanzaki Paper Manufacturing	488	2.8	488	4.7	0	0
Settsu Paper Board Manufacturing	414	2.4	0	0	414	5.8
Mitsubishi Paper Mills	413	2.4	373	3.6	40	0.6
Daishowa Pulp Manufacturing	390	2.2	0	0	390	5.5
Total of 10 companies	**8,379**	**48.0**	**6,415**	**62.0**	**1,964**	**27.7**
Others	9,074	52.0	3,938	38.0	5,136	72.3
Total	**17,453**	**100**	**10,353**	**100**	**7,100**	**100**

Source: Japan Paper Assn.

TABLE 1: **The 10 leading Japanese paper and paperboard manufacturers in 1982 in terms of production (000 tons).**

Dr. Thorn is professor of economics at the Univ. of Pittsburgh, Pittsburgh, Pa., and director of the university's Economic Policy Institute.

1982 came from the U.S. Most of it was shipped by Weyerhaeuser, which established a storage center in Japan in 1982, thus cutting sharply the delivery time and assuring a stable supply. This U.S. company succeeded in stablizing the Japanese price by revising its sales contracts with Japanese clients and quoting its prices in yen, thereby assuming the exchange rate risk itself.

Imported kraft linerboard is superior to its Japanese counterpart in strength and is 10% to 20% cheaper because of the higher pulpwood and energy costs in Japan. The import of this product, therefore, poses a great threat to the future profitability of Japanese linerboard production procedures.

THE JAPANESE INDUSTRY. The production of paper and paperboard in Japan grew 10% to 11% annually from 1965 to 1973, a period of spectacular economic growth. Reflecting the slowdown in demand through the protracted recession that followed the first oil shock in 1973, Japanese paper production has dropped to an annual average increase of 1.1% (through 1982).

Paper and paperboard production in 1982 reached 17,450,000 tons (up 2.8% from the preceding year), and shipments were 17,480,000 tons (up 1.8%). Domestic demand was also weak at 16,750,000 tons (up 1.2%). Demand for paperboard, in particular, dropped 0.4% from the preceding year, the third consecutive drop. This is due to the fact that in packaging, corrugated board is being replaced by thinner materials to conserve resources.

Japan currently has some 580 paper and pulp manufacturers, of which 71 are large companies affiliated with the Japanese Paper Assn. The remaining 50% are medium-to-small firms. The diversity of paper products provides ample room for numerous firms to coexist.

The 71 major companies have an 84% share of total production. The production of the leading company accounts for 10% and the top five, for 34.7% of the total. The profit of these companies, except for manufacturers of art paper and other special products, is below the average for manufacturing industries. Reasons for this

Renting space is a major expense of opening a branch office in Japan

■ Trade consultants agree that one of the quickest ways to penetrate the Japanese market is to open a market research-oriented representative office or sales company in Tokyo. Since most major Japanese companies have their headquarters in Tokyo, it is not surprising that most foreign companies have located their representative offices there also. But the price of doing this is not cheap.

Tokyo's average initial cost of a 1,775-ft² office for about 10 people—according to the Japan Building Owners & Managers Assn., which keeps tabs on nearly 400 office buildings in Tokyo—is 22 million yen (US$92,000). This includes a deposit of 21 million yen (US$88,000), a monthly rent of 851,000 yen (US$3,620), and a monthly building maintenance fee amounting to roughly 20% of the rent, or 172,000 yen (US$720).

Although the deposit is returned when the tenant moves out, it still is a large sum to pay out—and no one escapes it. The deposit payment began in the postwar years when office buildings were few in number and when the owners desperately needed funds to rebuild their war-torn buildings. The economic slowdown of the past years has dampened the rate of increase on deposits more than the growth of rents, but mandatory deposits will undoubtedly persist for some time to come.

Initial expenses on an office vary considerably according to the age of the building and its location in Tokyo. The 18-story Twin Tower building in the high-class Akasaka district charges a total initial payment of 31 million yen (US$130,000), or about 40% more than the average Tokyo cost for the same 1,775-ft² space.

In Tokyo, the average space for an office with 10 people is 1,400 ft², but office consultants believe 1,775 ft² is necessary for comfortable working conditions. This space is the smallest unit for rent in the brand new Akasaka Twin Tower.

Small offices. For an even smaller setup, such as a representative office for about four people, special compact buildings with mini offices of 710 ft² are available at upward from 4,784,000 yen (US$20,000) in residential neighborhoods near business centers. The cost of renting an office can be further economized by converting an apartment into an office. A 635-ft² apartment in the Shinagawa district, about 10 minutes from Tokyo Central Station by city train, requires an initial cost of 615,000 yen (US$2,580), or only 13% of the cost of the 710-ft² mini office that is within walking distance of a central business location.

Apartment building owners usually ask for two months' rent as a gift and one or two months' rent for the security deposit—a rather modest initial investment compared with the deposit required for an office building. Apartments are a practical solution for low cost entry into Japan. Once established in Tokyo, the cost of expanding into other big cities is relatively inexpensive. Compared with the number one location, Tokyo, the initial cost of renting an office in Osaka and Nagoya—Japan's number two and number three cities—is 43% and 53% lower, respectively.

The monthly building maintenance fee that must be paid along with each month's rent amounts to approximately 15% to 20% of the rent. In addition, each tenant needs to bear other costs such as heating, air conditioning, ventilation, and window washing, although these vary according to each building.

Staff costs. The greatest cost of a Japanese office, however, is employees. The average annual pay in Japan is more than 3.3 million yen (US$13,900), which means that the total monthly pay of three workers is as costly as the rent for a plush office in the Akasaka Twin Tower building. Salaries go up annually while office rents generally increase every other year, both keeping pace approximately with the rate of inflation.

The office space vacancy rate is 1.6% nationally and 0.8% for Tokyo. Although most office buildings seem to be occupied, about 16% in Tokyo alone have one or more vacant offices for rent. ■

include a heavy financial burden on the companies due to excessive dependence on borrowings, a rise in pollution-prevention investment, and growing energy costs.

Obviously overloaded with surplus equipment and without the prospect for an improvement of the paper market, the Japanese pulp and paper industry has been designated by law as a structurally depressed industry. It made efforts to survive the recent recession and stabilize its business management under special provisions provided by the law for depressed industries.

Operating rates in 1983 were estimated at 70% to 75% for paper and about 60% for paperboard. It should be noted that the rate for paperboard remains low even though about 20% of the corrugated board material capacity (including kraft)—which accounts for about 60% of paperboard production—was scrapped in 1979. This means that about 30% of all paperboard manufacturing equipment is in excess capacity.

As for the market trend, despite the industry's voluntary efforts to reduce production, principally for three major types of paper (coated paper, high-quality paper, and kraft paper), prices have drifted downward due to sluggish demand. Specifically, the price of paperboard, centering on corrugated board material, has been on the downturn. Recovery of the paperboard market has been difficult because of increasing paper imports and intensified competition among domestic producers.

The Japanese law dealing with structurally declining industries was aimed at averting social hardship due to unemployment and reducing the impact on regional economies, which are seriously affected by these industries. While it is left up to each individual industry to chart its future direction on the basis of market principles, this law assists impacted industries in making a transition to a more viable state.

FUTURE OUTLOOK. While Japanese paper imports are steadily increasing, domestic demand is expected to stagnate in future years. According to the Japanese government's estimate, domestic demand for paper will show an annual average growth of 2% to 3% at best. In this environment, the Japanese paper industry is making several efforts to improve its situation.

First, the industry is moving toward reorganization. In 1983 at least four mergers were completed among larger companies. Some observers maintain that the pulp and paper industry should be streamlined through amalgamation into about 10 groups, with lead companies at the core. These observers further advocate that surplus facilities and equipment should be scrapped and a joint production and sales system be set up. Moves toward reorganization are likely to accelerate.

So far the industry has tried to cut production costs by increasing its use of recycled newsprint. However, the collection of used newsprint is approaching a practical limit, and the industry is forced to find a new solution. In August 1982, 26 Japanese pulp and paper companies organized the Pulp & Paper Research Assn. (PPRA), with the purpose of developing new energy-saving technology for manufacturing paper. In other efforts, paper companies in Japan are studying the feasibility of relieving their interest burden by reducing borrowing, stabilizing the price of raw materials with a project to develop pulp and pulpwood overseas for import to Japan, and improving plant operation rates through selective scrapping of manufacturing equipment. ■

VARIABLE-SPEED DRIVES IMPROVE CONTROL

(Continued from page 134)

Originally, wound rotor motors used in adjustable-speed drives had variable resistors in the rotor circuit. Rotor energy was converted to heat in the resistors and lost in the atmosphere, or cooling equipment was added to remove the heat. The efficiency of the drive was poor, and a method of recovering the energy was needed.

Today, the slip energy from the rotor circuit is rectified to d.c. and converted to a fixed voltage and fixed frequency to be fed to the motor stator. The invertor for the slip recovery unit is line commutated. The a.c. power source supplies energy to turn off thyristors, similar to a d.c. drive operating in the regenerative mode. This eliminates a separate commutating circuit need.

The slip energy recovery drive is of similar or higher efficiency when compared with other electronic drives. The major cost item is the motor, as in the case of a d.c. drive. Full motor power does not go through the controller, unlike other electronic drives. When a limited speed range is required, it allows the controller to be sized significantly less than the rated motor power, and thus allows use of a lower cost controller. The wound rotor slip recovery drive operates below synchronous speed and cannot operate above it.

Cycloconverter drive. A cycloconverter converts a.c. input at line frequency to another frequency through a one-step process. One converter is used for each phase winding of the motor. Power circuit (Figure 7) operates in the phase-control, line-communication mode.

The maximum output frequency applied to the motor is only a fraction of the supply frequency. The cycloconverter may be applied to both synchronous and induction motors. The control system is designed to obtain performance from the rotating field machine equal to that of a d.c. machine under current control. The cycloconverter drive is normally furnished for very large-horsepower, low-speed applications, providing high efficiency and fast response.

EFFICIENCY RATINGS. Electronic adjustable-speed drives are highly efficient over their total operating speed range. This contrasts other methods of modulating process output, such as fan dampers and throttling valves on pumps. Other types of adjustable-speed drives have significant slip loss, which drastically reduces efficiency at points below full speed. Total energy loss and operating power cost depend not only on drive efficiency but on the operating load profile of the application.

Efficiency evaluations are normally made between electronic drives and other methods of control. In some cases, a comparative analysis is needed for the various types of electronic drives described in this article. However, a general comparison is not possible. Efficiencies will vary between specific products in each type of drive. These variations are greater than any general differences between drive types. Motor design and the specific operating points for efficiency calculations are the largest contributors to efficiency differences. Power circuit configuration also has an effect.

Different drive types will have different efficiencies, depending on the specific application. Therefore, efficiency comparisons between electronic adjustable-speed drives should be made for each particular application and for the specific equipment involved. ■

Alum markets remain steady as prices rise

By BARRY SHOCKETT

U.S. alum consumption is still on an even keel, having increased on aggregate only about 2,500 tons from 1979 to 1983. This situation is not expected to change significantly in the immediate future. Price increases will be tied mainly to raw material and transportation costs.

Sparked by strong growth in municipal sewage applications, total alum demand in Canada is expected to grow between 4% to 5% over the next four years.

U.S. statistics, 17% Al_2O_3 (000 short tons)

	1980	1981	1982	1983e
Nameplate capacity[1]	2,300	2,500	2,565	2,600
Production	1,182	1,206.5	1,186.5	1,200
Imports	26.8	27	24.8	33
Exports	11.6	28	6.8	17
Apparent consumption	1,197r	1,205.5r	1,204.5	1,216

1. Based on industry estimates of operating rates. r=revised.
Source: Bureau of Census, U.S. Dept. of Commerce

Canadian statistics, 17% Al_2O_3 (000 short tons)

	1980	1981	1982	1983e
Nameplate capacity	275.5	275.5	286.5	297.5
Production	199r	196.5	192r	203
Total demand	177.5	176.5	171r	185
Internal paper sizing	54	52	49.5	52
Other pulp/paper	53	53	48.5	52
Municipal water/sewage	53	55.5r	57.5	65
Miscellaneous[1]	17.5	18r	15.5r	16.5
Exports	22	23	21	21
Imports	1.5	3	2.2r	3.5

1. Including pigment. r=revised.

ALUMINUM SULFATE

UNITED STATES

Uses: Aluminum sulfate is used by the pulp and paper industry for internal sizing, pitch control, and water treatment. Nonpaper applications include potable water and wastewater treatment.

Demand: Demand for alum by the pulp and paper industry rose between 5% to 6% in 1983, to an estimated 650,000 tons. Usage remained steady in 1981 and 1982 at the 615,000-ton level. Water and sewage treatment consumption was up slightly last year to about 462,000 tons, compared with 458,000 tons in each of the two previous years.

Sources: Of the 15 or so producers in the U.S., Allied Chemical, American Cyanamid, and Stauffer Chemical account for 75% to 80% of total capacity. Allied's third plant in Florida came onstream at the beginning of the fourth quarter in 1983, boosting its total capacity to over the 1-million-tpy mark.

Availability: There are no shortages on the immediate horizon since industry operating rates are still below 50%. 1984, market; 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: The first increase for alum since July 1981 went into effect on Jan. 1 of this year and brought the liquid price to $145/ton (up 9%). Pricing history: 1983, $133/ton, bulk, liquid (17% Al_2O_3), f.o.b. works, freight equalized; 1982, $133/ton; 1981, $121-$131/ton; 1980, $101-$109/ton; 1979, $89-$94/ton.

Forecast: Alum consumption by the pulp and paper industry is not expected to increase this year to the same extent as in 1983. Similarly, total demand will probably remain in the 1.2- to 1.3-million-ton range for the foreseeable future. If material and freight costs continue to increase (the major reason for the price hike in January), there may be another boost by the end of 1984 or early in 1985.

CANADA

Uses: The pulp and paper industry uses alum for resin sizing, pitch control, process water treatment, and pH control. Other end uses for alum include municipal water treatment, sewage treatment, pigments, and synthetic crude production.

Demand: Pulp and paper industry alum usage is split about 50:50 between resin sizing and other uses and last year accounted for about 56% of total demand. In 1983, mill demand increased to an estimated 104,000 tons from the 98,000 tons used in 1982. Internal resin sizing consumed 52,000 tons in 1983 and 49,500 tons in 1982. Total demand also rose in 1983 to 185,000 tons vs 171,000 tons in 1982.

Sources: Five producers in Canada operate 14 plants. Alcan Smelters & Chemicals and Allied Canada's Allied Chemical Div. together account for 72% of total capacity. The next largest producer is C-I-L sulfur products west (formerly called Inland Chemicals), followed by United Chemicals and Borden Chemical.

Availability: Since last year's industry operating rate was only 68%, there should be no supply problems to the end of the decade. 1984, market; 1983, market; 1982, market; 1981, market; 1980, market; 1979, market to tight.

Pricing: Aluminum sulfate prices were hiked only once in 1983. Bulk liquid (17% Al_2O_3) rose about $8/ton to $139.71/ton on Apr. 1. At the start of 1984, lists rose 5% to $146.97/ton. Pricing history: 1983, $131.54-$139.71/ton, f.o.b. works; 1982, $131.54/ton; 1981, $100.70-$119.75/ton; 1980, $86-$100.70/ton; 1979, $79-$86/ton; 1978, $73/ton.

Forecast: Alum usage by the mills is slated to increase to 123,500 tons by 1987, an average annual growth of 4.5%. Of that amount, an estimated 63,000 tons will be employed for resin sizing. No further price boosts are expected in 1984.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

NOTE

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COVER: *Austell Box Board's new coal-fired boiler is featured as part of this issue's focus on Power & Steam. (Staff photo by Matt Coleman.)*

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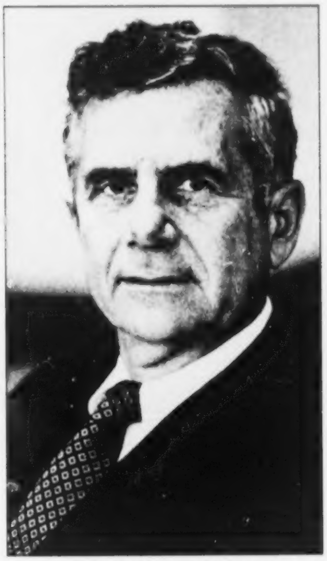

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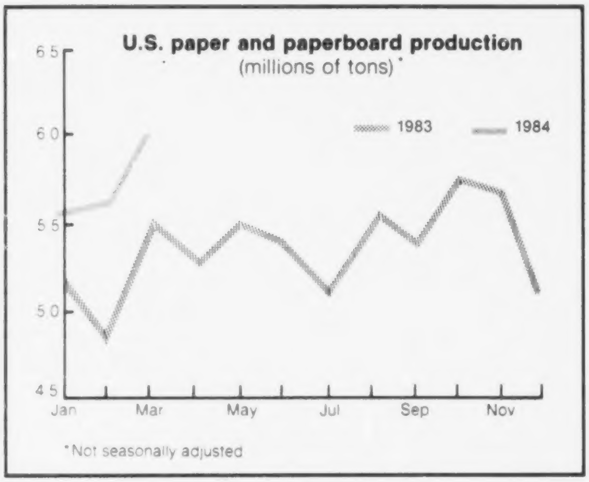
MONTH IN STATISTICS

U.S. paper and paperboard production in March jumped 9.3% over last year to a very strong 6.03 million tons, the first time ever that a single month's production has exceeded 6.0 million tons, said the American Paper Institute. Both paper and board production exceeded 3.0 million tons for the month, another record. The February-March two-month moving average of seasonally adjusted data was down 1.0% from February, however, to a rate of 87.9 million tpy. In part, API said, the drop reflects the fact that some grades are at maximum capacity, preventing mills from making the usual seasonal increases.

Among major grades, printing and writing papers continued to lead the way. For the first quarter, uncoated groundwood was up 18.9% on a seasonally adjusted basis over last year, while coated output jumped 18.0%. Containerboard was up 13.0% for the quarter, led by a 15.1% increase in recycled board. Shipments of corrugated boxes climbed 8.4% in March to 23.650 billion ft², according to the Fibre Box Assn.

Canadian newsprint shipments in March dropped 0.3% from last year to 6.7 million tons, said the Canadian Pulp & Paper Assn., while operating rates stood at 79%.


U.S. paper and paperboard production
(millions of tons)*

*Not seasonally adjusted

		Latest month (000 short tons)	**% change from year ago**	**Annualized year-to-date** (000 short tons)	**% change from year ago**
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	March	478	6.7	5,560	6.2
Uncoated groundwood (s)	March	143	15.3	1,654	18.9
Coated paper (s)	March	537	18.5	6,274	18.0
Uncoated free sheet (s)	March	782	2.1	9,192	7.7
Unbleached kraft packaging and industrial (s)	March	352	12.5	3,982	4.4
Tissue	March	426	7.8	4,911	5.0
Total paper	**March**	**3,023**	**9.0**	**35,029**	**9.4**
Kraft linerboard, unbleached	March	1,394	6.7	15,875	10.0
Semichemical medium	March	452	14.4	5,173	15.2
Bleached paperboard	March	357	6.6	4,074	5.1
Recycled paperboard	March	702	13.8	8,088	15.1
Total paperboard	**March**	**3,007**	**9.5**	**34,342**	**11.4**
Total paper and paperboard[5]	**March**	**6,030**	**9.3**	**69,371**	**10.4**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	February	4,538	12.2	54,309	9.3
Market pulp production	February	564	15.6	6,631	15.5
Wastepaper consumption at paper/board mills	February	1,276	15.4	15,410	11.2
Pulpwood consumption (cords)	February	7,295	7.7	86,880	5.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	March	23.650	8.4	67.703[6]	11.7
Containerboard inventories at box plants	Mar. 1	2,468	2.7		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	February	853	54.0	1,044	40.3
Imports of Canadian newsprint	February	612	41.7	7,570[6]	29.7
U.S. paper exports (including products)	February	331	−11.5	4,033	−7.1
Exports of unbleached kraft linerboard	March	102	−47.7	1,131	14.2
Exports of woodpulp	February	317	20.5	3,461	14.3
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	March	674	−0.3	2,018[6]	7.0
Operating rates	March	79%	80%	84%	81%
Inventories held by U.S. consumers	Mar. 31	1,234	−2.1		
Woodpulp shipments (export only)	March	441	25.3	1,487[6]	−4.6
Operating rates	March	60%	85%	71%	83%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Corrugating medium: Tight market forecast due to slow capacity growth

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons			
Semichemical[1]	4,389	4,731	5,025
Recycled[1]	1,156	1,302	1,430
Total	5,545	6,033	6,455
Capacity, 000 tons			
Semichemical	5,207	5,156	5,218
Recycled	1,478	1,555	1,582
Utilization rates, %			
Semichemical	84.3	91.8	96.3
Recycled	78.2	83.7	90.4
Imports, 000 tons[2]	47	70	70
Exports, 000 tons[2]	61	74	80
Apparent U.S. consumption			
000 tons	5,531	6,029	6,445
lb/capita	47.68	51.48	54.62
000 tons/$billion real GNP (1972)	3.72	3.92	4.00

1. American Paper Institute. 2. Bureau of Census. e=estimated

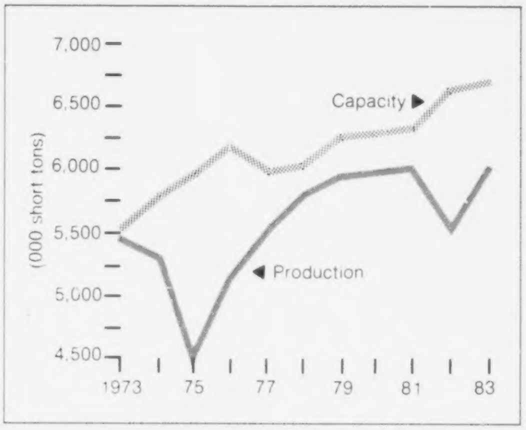
GRADE STRUCTURE: Corrugating medium includes paperboard made from both semichemical pulp and recycled fiber. In 1983, 78% of corrugating medium was made from semichemical pulp furnish (which normally contains at least 20% recycled fiber), and 22% was "bogus" medium, made from recycled fiber. Basis weights of corrugating medium are 22, 26, 33, and 36 lb/1000 ft². Standard sheet weight is 26 lb, which accounts for more than 80% of production. Recycled medium for equivalent uses is normally produced in slightly higher weights.

PRODUCTION/CAPACITY: In 1983, production of corrugating medium jumped by 8.8% to 6.03 million tons, reflecting a 7.4% rise in U.S. corrugated box shipments. Semichemical medium production increased 7.8% to 4.73 million tons, while recycled medium jumped 12.6% to 1.3 million tons.

With almost flat capacity growth last year, operating rates for semichemical medium mills snapped back to 91.8% from 84.3% in 1982, while recycled medium mills ran at 83.7% in 1983. Availability of semichemical medium became tight toward the end of 1983 with some integrated companies scratching for supplies. The startup of several machines idled during the recession has helped to ease the tightness. Most recently, a 300-tpd machine at Manville Forest Products was to have been reactivated by mid-year.

OUTLOOK: With corrugated box shipments forecast to jump another 7% in 1984, corrugating medium production should rise by a similar amount (assuming no major change in inventories) to about 6.46 million tons. Semichemical medium output is forecast to rise 6.2% to 5.03 million tons; recycled medium should jump 9.8% to 1.4 million tons.

With overall capacity expected to rise only 1.3% this year, operating rates in 1984 for semichemical medium mills and recycled mills should average 96.3% and 90.4%, respectively. Semichemical medium capacity is forecast to rise only 97,000 tons over the 1984-86 period, while recycled medium capacity increases only 30,000 tons, according to the latest American Paper Institute capacity survey.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)			
	Semichemical medium	**Recycled medium**	**Total**	**Capacity share (%)**
1. Weyerhaeuser	609	—	609	11.7
2. Owens-Illinois	600	—	600	11.5
3. Inland Container	186	246	432	8.3
4. Stone Container	387	—	387	7.4
5. Willamette Industries	230	120	332	6.4
6. Champion International	206	125	331	6.3
7. Mead	330	—	330	6.3
8. Container Corp.	115	160	275	5.3
9. Packaging Corp.	254	—	254	4.9
10. International Paper	245	—	245	4.7
11. Virginia Fibre	215	—	215	4.1
12. MacMillan Bloedel	210	—	210	4.0

U.S. capacity (1984): 5.218 million tons
Capacity share of top five companies: 45.2%
Capacity share of top ten companies: 72.7%

PRICING: Containerboard producers pushed through a $30/ton price increase on Feb. 1, which lifted the price of 26-lb semichemical medium to $310/ton. This brought the price over its prerecession peak of $290/ton which had been in effect through most of 1981. Discounting during the recession drove prices to $240/ton and below during late 1982 and early 1983—an unprofitable level for most semichemical medium mills. Another attempt to boost medium prices by as much as $40/ton is expected this fall as producers attempt to restore profit margins before any possible weakening in the economy in 1985.

Price history for 26-lb semichemical medium in the eastern U.S. is as follows (year-end transaction prices): 1975, $200; 1976, $200; 1977, $180; 1978, $210; 1979, $260; 1980, $260; 1981, $260; 1982, $240; 1983, $280. Recycled medium may sell at the same level as semichemical or at about a $5/ton discount, depending on quality. The West Coast price has generally been slightly higher than the eastern price.

(News section continues on page 23)

SALES AND EARNINGS

Improved results show big gains ahead

U.S. pulp and paper companies posted solid gains in both sales and earnings for the first quarter of 1984, taking advantage of record production levels and a series of price hikes in a number of major grades to restore badly eroded profit margins. Earnings for the quarter were up 59.0% from the first quarter of 1983, while sales rose 19.2%, according to a *P&P* survey of 21 companies. A number of companies reported record sales and earnings, and most CEO's looked on the first quarter as a solid base for substantial gains throughout 1984. U.S. forest products companies reported profits up 88.5% from depressed year-earlier levels, according to the quarterly reports of seven companies, while sales were up 17.5%.

International Paper Co. reported first-quarter net income of $55.3 million, down 20.4% from the 1983 quarter. Excluding nonrecurring gains made in both years, however, pretax earnings increased over fivefold, IP reported. "Our improved operating performance is encouraging, and March was a strong month," said Edwin A. Gee, chairman and CEO. "Our operating rates are pressing full capacity, and the pricing environment for many of our products is better than it has been in several years."

St. Regis Corp.'s first-quarter earnings jumped 120.3% compared to 1983, totaling $27.1 million. Printing papers accounted for nearly half of St. Regis's profits from operations, said chairman and CEO William R. Haselton. Crown Zellerbach Corp.'s net of $21.2 million was up 3.9% from last year. "Results were better than we anticipated, particularly in view of the first-quarter seasonal decline we ordinarily experience in several of our businesses," said William T. Creson, chairman, president and CEO.

Records in packaging, tissue. Led by its paper operations, which set records in both production and earnings, Mead Corp.'s profits rose to $21.6 million for the first quarter, compared to a loss of $10.4 million last year. The company estimated a loss of $5.5 million from the labor-related shutdown of pulp mills in British Columbia.

Union Camp Corp. set a record for first-quarter earnings with net income of $42.2 million, up 57.4% from the 1983 quarter. Stone Container Corp.'s net totaled $2.4 million for the quarter, compared to a loss of $962,000 in the 1983 quarter. Temple-Inland Inc. also reported improvements in each of its business segments, with first-quarter earnings of $20.8 million up 114.4% from 1983.

Tissue producers benefited from higher unit volumes and price increases during the first quarter. Kimberly-Clark Corp. posted first-quarter net income of $53.2 million, up 1.3% from 1983, on record sales of $902.4 million, up 11.3%. Scott Paper Co.'s profits for the quarter totaled $34.2 million, a 78.9% improvement over the 1983 quarter. Fort Howard Paper Co. posted net income of $29.6 million for the quarter, up 26.1% from last year.

Low prices hurt building products. The first quarter marked a "slow start to a much better year," according to George H. Weyerhaeuser, president and CEO of Weyerhaeuser Co. The company reported net income for the quarter of $36.6 million, up 63.2% from the 1983 quarter.

Georgia-Pacific Corp. posted earnings of $51.0 million for the first quarter, up 70.0% from 1983, with improved results in all of its businesses. G-P's 1983 net included a pretax gain of $27 million from the settlement of a contract dispute.

Champion International Corp.'s net income rose 252.8%, to $29.1 million, from depressed year-earlier levels. Boise Cascade Corp.'s net of $27.9 million was up 150.5% from 1983. Louisiana-Pacific Corp. posted earnings of $6.7 million for the first quarter, up 55.8% from the 1983 quarter.

U.S. PAPER/FOREST PRODUCTS RESULTS

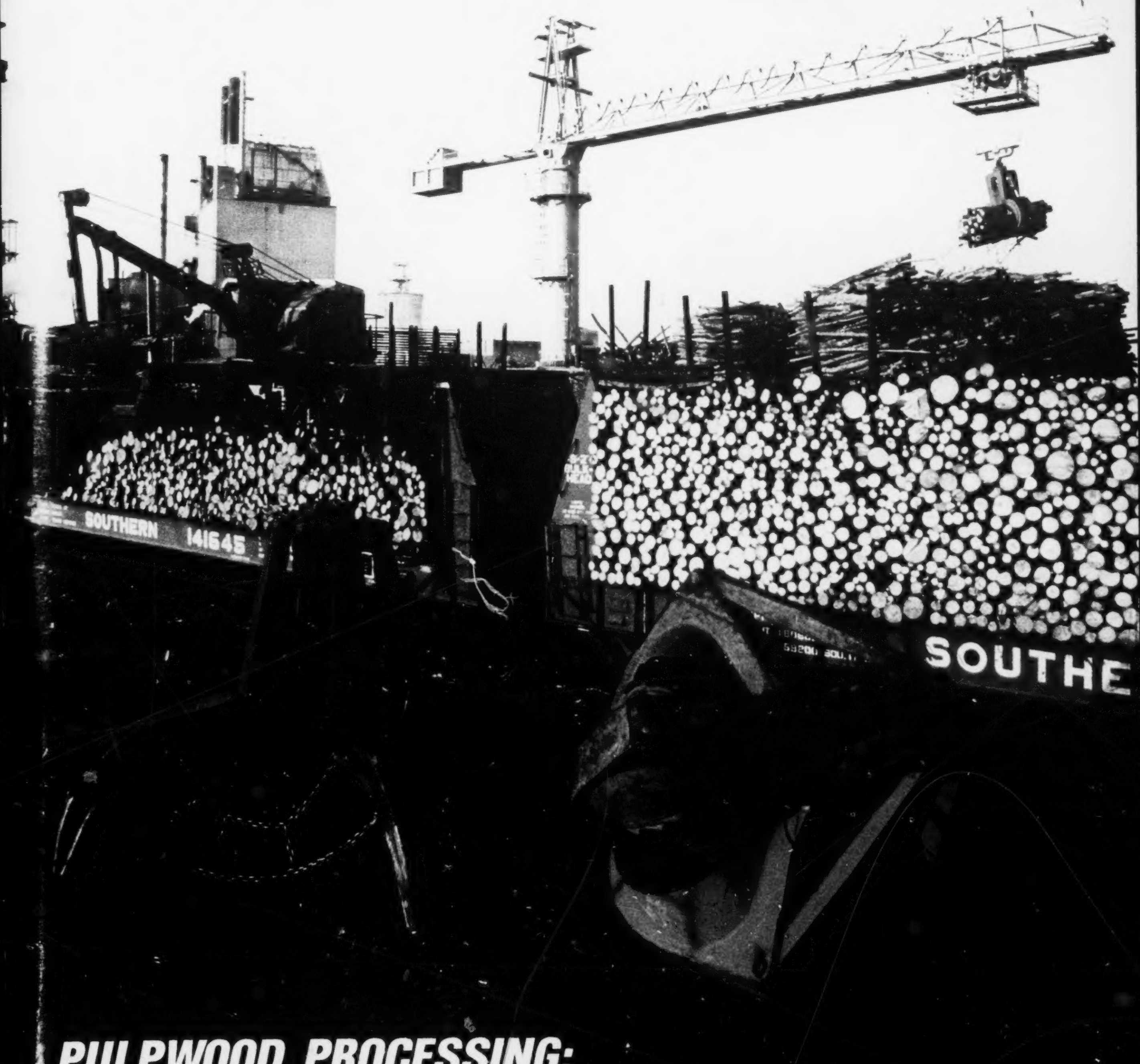
	First quarter ($000)			
Paper companies	**Sales**	**Change 1984/83**	**Earnings**[1]	**Change 1984/83**
Chesapeake	$73,750	23.2%	$2,760	161.0%
Consolidated	171,203	24.7	19,467	83.7
Crown Zellerbach	713,100	15.6	21,200	3.9
Federal Paper	138,901	10.5	4,980	3242.3
Fort Howard	306,267[2]	129.7	29,630	26.1
Glatfelter	84,733	38.4	9,457	114.1
GN Nekoosa	459,100	23.5	29,700	95.4
Hammermill	423,730	19.0	15,150	357.3
Int'l. Paper	1,154,900	6.1	55,300[3]	−20.4
James River (1/22)[4]	556,699	32.0	20,737	87.4
Kimberly-Clark	902,400	11.3	53,200	1.3
Mead	657,300[5]	20.4	21,600	n.m.[6]
Mosinee	52,175[7]	117.3	2,586	112.7
Pentair	119,362	70.8	5,783	237.2
St. Regis	775,400	19.1	27,100	120.3
Scott	612,797	8.0	34,198	78.9
Stone Container	315,507	164.3	2,414	n.m.[6]
SW Forest	174,806[5]	33.9	3,441	n.m.[6]
Temple-Inland	313,500	9.5	20,800	114.4
Union Camp	490,559[5]	23.9	42,197	57.4
Wausau (2/29)[4]	53,658	27.2	819[8]	−31.9
Willamette	284,048	14.9	8,188	119.1
Total	**8,833,895**	**21.6**	**430,617**	**60.5**
Forest products				
Boise Cascade	948,180	23.0	27,880	150.5
Champion Int'l.	1,147,687	14.6	29,129	252.8
Georgia-Pacific	1,631,000	14.9	51,000[9]	70.0
Louis.-Pacific	308,960	28.6	6,730	55.8
Pope & Talbot	81,892	22.5	2,110	−3.5
Potlatch	250,105	16.2	12,528	28.9
Weyerhaeuser	1,277,534	17.3	36,648	63.2
Total	**5,645,358**	**17.5**	**166,025**	**88.5**
U.S. total	**14,479,253**	**20.0**	**596,642**	**67.4**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. 1984 figures include results of Maryland Cup Corp., acquired in September 1983.
3. Net income includes pretax gains of $16.8 million from sale of land in 1984 and $63.5 million from sale of timber in 1983.
4. Period ended. James River figures are third quarter; Wausau second.
5. 1983 results restated by company.
6. Not meaningful due to loss in 1983 quarter.
7. 1984 figures include results of Sorg Paper Co., acquired in June 1983.
8. 1983 net includes a pretax gain of $469,000 on sale of Hennepin Paper Co.
9. 1983 net includes a pretax gain of $27 million from settlement of a contract dispute.

n.m. = not meaningful.

PULP & PAPER

July 1984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Chipping away at woodyard costs

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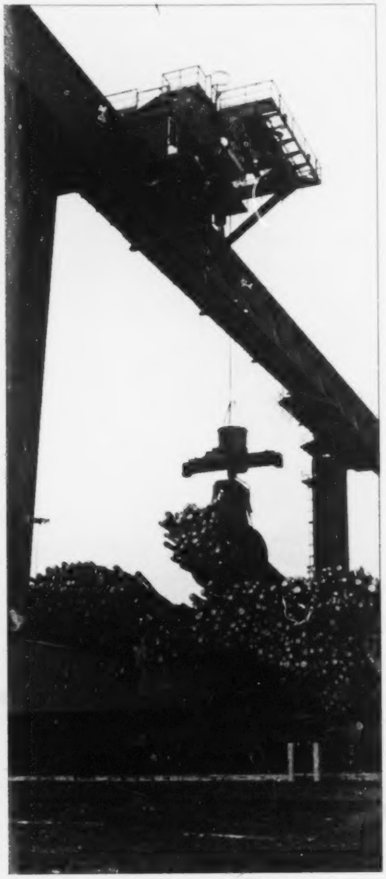

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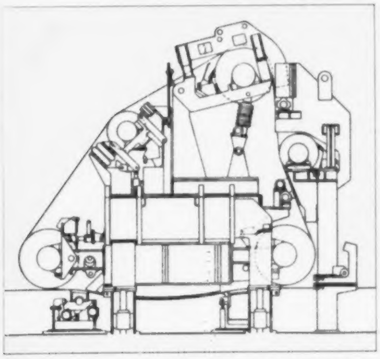

TOP WIRE FORMERS **114**

COVER: *The modern, efficient woodyard as typified by Chesapeake's West Point, Va., mill is examined in this issue's special focus on pulpwood processing. (Photo courtesy of Chesapeake Corp.)*

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FIRST A
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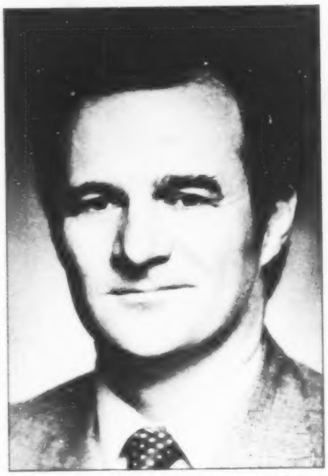
FASTEST SACKER IN API PACK-OFF **31**



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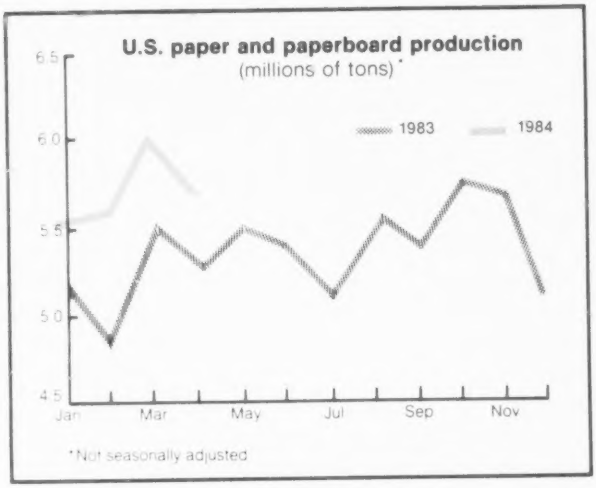
MONTH IN STATISTICS

U.S. paper and paperboard demand in April continued at the record high pace evident since last October. Total tonnage in the January-April period was up 10% over the same period in 1983, according to the American Paper Institute. The March-April moving average of seasonally adjusted data was at the rate of 67.8 million tpy, very close to the 68.3-million-tpy rate for the January-April period.

Among the major grades, printing and writing papers continued to show important gains with the four-month period up 10.8% compared with 1983. Coated paper output paced this rise—production in the period was 16.7% above the 1983 level. Tissue paper grades were up 4.1% with a production of 4.9 million tons, a record high, and containerboard output showed a 13% gain. Corrugated shipping containers jumped 10.6% for the period, and April's shipments of fiber boxes was the highest April total on record, reported the Fibre Box Assn.

Canadian newsprint shipments slid 1.3% in April compared with the same month last year, but were up 4.8% in January-April over the same 1983 period, according to the Canadian Pulp & Paper Assn. April's operating rates were at 89%.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	April	465	16.3	5,564	8.5
Uncoated groundwood (s)	April	127	0.0	1,592	10.4
Coated paper (s)	April	507	17.6	6,172	16.7
Uncoated free sheet (s)	April	744	0.8	9,281	7.5
Unbleached kraft packaging and industrial (s)	April	334	15.2	3,990	6.9
Tissue	April	405	5.2	4,898	4.1
Total paper	**April**	**2,875**	**9.1**	**34,995**	**9.3**
Kraft linerboard, unbleached	April	1,332	8.0	15,910	9.8
Semichemical medium	April	427	10.9	1,168	7.8
Bleached paperboard	April	348	5.4	4,101	5.0
Recycled paperboard	April	687	20.7	8,229	14.4
Total paperboard	**April**	**2,888**	**10.8**	**34,564**	**10.8**
Total paper and paperboard[5]	**April**	**5,763**	**9.9**	**69,560**	**10.0**
PULP, WASTEPAPER & FIBER [2]					
Total woodpulp production	March	4,858	6.3	55,642	8.3
Market pulp production	March	592	2.6	6,779	10.0
Wastepaper consumption at paper/board mills	March	1,389	11.0	15,830	10.7
Pulpwood consumption (cords)	March	14,480	113.9	57,920	5.2
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	April	21,960	7.5	89,663[6]	10.6
Containerboard inventories at box plants	Apr. 1	2,448	−0.1		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	March	860	16.8	10,395	28.1
Imports of Canadian newsprint	March	239	−6.1	7,374[7]	16.3
U.S. paper exports (including products)	March	402	15.5	4,295	−0.5
Exports of unbleached kraft linerboard	April	169	8.2	1,995	−11.5
Exports of woodpulp	March	373	12.3	3,801	13.6
CANADIAN STATISTICS [4] (reported in metric tons)					
Total newsprint shipments	April	701	−1.3	2,719[6]	4.8
Operating rates	April	89%	82%	85%	82%
Inventories held by U.S. consumers	Apr. 30	1,189	−3.3		
Woodpulp shipments (export only)	April	433	−11.6	1,920[6]	−6.3
Operating rates	April	80%	74%	73%	81%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Recycled paperboard: Clay-coated demand lags; housing helps uncoated

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons[1]	6,476	7,234	7,925
Capacity, 000 tons[1]	8,690	8,845	8,937
Utilization rate, %	74.5	81.8	88.7
Imports, 000 tons	32	50	75
Exports, 000 tons	158	150	132
Apparent U.S. consumption			
000 tons	6,350	7,134	7,868
lb/capita	54.4	60.8	66.7
000 tons/$ billion real GNP (1972)	4.27	4.65	4.89

[1] American Paper Institute data.

GRADE STRUCTURE: Recycled paperboard is usually made almost entirely of wastepaper. It is divided into three categories: folding boxboard, setup boxboard, and paperboard. It can be produced on both fourdrinier and multi-ply paper machines. Folding boxboard is clay-coated, while setup boxboard is uncoated. Recycled paperboard includes corrugating medium, linerboard, gypsum linerboard, core, can and tube stock, but excludes construction papers or board.

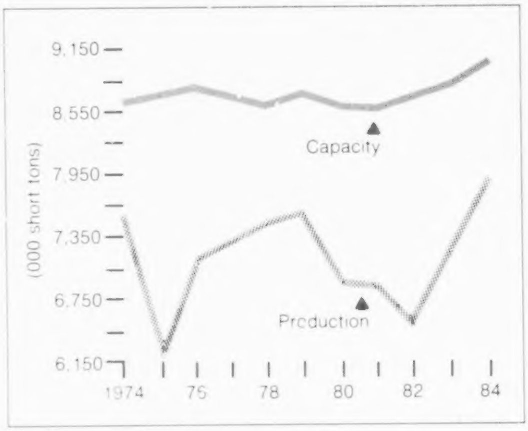
PRODUCTION/CAPACITY: Production rose 11.7% to 7.23 million short tons in 1983 from 6.48 million short tons in 1982. The recycled paperboard market should show substantial improvement in 1984, with production for the first quarter up 15.1% from a year ago. Among major markets for recycled paperboard, folding boxboard was up 11%; setup boxboard, 13%; tube, can and drum stock, 21%; gypsum wallboard facings, 52%; and panelboard up 47% from last year.

Slow capacity growth will help operating rates, with this industry expanding at just 1%/year over the next three years to 9.01 million tons in 1986. Improving market conditions, however, could cause some idle mills to reopen. One major expansion not included in the latest American Paper Institute capacity survey figures is Temple-Inland's new 175,000-tpy recycled linerboard mill in Ontario, Calif., set for startup in late 1985.

OUTLOOK: Continued strong demand for housing and autos, plus growing demand for consumer goods packaged in boxboard should keep recycled board consumption advancing. High operating rates for kraft linerboard and semichemical medium should keep recycled containerboard demand up.

Recycled paperboard production is expected to reach 7.92 million tons in 1984, 9.6% higher than last year, and operating rates should reach 88%, vs 82% in 1983. Prices for the lower grades such as chipboard and white-lined vat should be quite strong in the second half of 1984. Clay-coated prices should show substantial improvement by the year-end, reaching—and possibly exceeding—their 1981 levels.

PRICING: Clay-coated boxboard prices remained weak during the first half of 1984, although producers were able to pass on some of their increased wastepaper costs. Uncoated boxboard prices showed greater strength. Recycled boxboard prices should show substantial improvement through the second half of 1984, possibly exceeding 1981 peak levels. Prices below may reflect postdiscount transaction levels.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	**Capacity share** (%)
1. Container Corp. of America	781	8.7
2. Sonoco Products	600	6.7
3. Jefferson Smurfit[1]	534	5.9
4. National Gypsum	417	4.7
5. U.S. Gypsum	377	4.2
6. Caraustar Industries[2]	325	3.6
7. Newark Group	325	3.6
8. Federal Paper Board	300	3.4
9. Rock-Tenn	255	2.8
10. Whippany Paper Board[3]	168	1.9
11. Republic Gypsum[4]	125	1.4
12. Packaging Corp. of America[5]	104	1.2

U.S. capacity (1984): 8.937 million tons
Capacity share of top five companies: 23.0%
Capacity share of top ten companies: 45.7%

[1] Includes Alton Packaging Corp. and Smurfit Packaging Corp.

[2] Holding company with ownership in Austell Box Board, Sweetwater Paper Board, Carolina Paper Board, and Carotell Paper Board.

[3] Capacity figure represents tonnage at Clifton and Whippany (Hanover), N.J., mills, which have been closed since Whippany declared bankruptcy in 1980.

[4] Bought Packaging Corp. of America's Hutchinson, Kans., and Denver, Colo., chipboard mills in November, 1983.

[5] Sold three recycled paperboard mills equaling 214,000 tons of capacity and shut down a 49,000-tpy clay-coated recycled board machine in 1983.

Clay-coated 20-pt folding boxboard (rolls), $/short ton (year-end): 1975, $257; 1976, $262; 1977, $284; 1978, $305; 1979, $355; 1980, $380/400; 1981, $400/425; 1982, $380/425; 1983, $370/425; May 1984, $370/425. Bending 20-pt chipboard (rolls), $/short ton (year-end): 1975, $204; 1976, $212; 1977, $219; 1978, $225; 1979, $260; 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; May 1984, $370/425.

MARKETS: Market demand for recycled paperboard grades as measured by their capacity share is: folding boxboard, 30.4%; setup boxboard, 3.7%; corrugating medium, 17.7%; gypsum linerboard, 13.7%; linerboard, 5.1%; container chipboard and filler board, 2.9%; other paperboard 26.3%.

(News section continues on page 23)

FINANCE

Canada has mixed first-quarter results

Results in the Canadian forest products industry were sharply divided along geographic lines in the first quarter, according to a *Pulp & Paper* survey of 14 companies. Western financial reports were hit hard by the labor dispute in British Columbia that shut down the industry for ten weeks, resulting in the loss of some 700,000 metric tons of pulp production (*P&P*, May 1984, p. 27). Eastern pulp and paper companies, on the other hand, continued their steady climb out of the last recession, reporting earnings up seven-fold from severely depressed year-earlier levels on sales up 22.8% from last year. Earnings for the 11 pulp and paper companies surveyed totaled C$26.7 million, compared with a loss of $44.7 million last year.

In eastern Canada, strong sales gains and price increases for pulp and fine papers were behind the improved results, and most CEO's expressed optimism for continued gains throughout 1984. Domtar Inc. posted first-quarter income of $23.9 million, a 30-fold increase from the $700,000 reported in the 1983 quarter. Sales also improved dramatically, rising 24.1% year-to-year. Abitibi-Price Inc.'s profit for the quarter totaled $10.3 million, a gain of 412% over 1983. The company credited increased sales of all products and a more favorable U.S. exchange rate and said that newsprint operating rates were near capacity late in the quarter.

Consolidated-Bathurst Inc. announced first-quarter net income of $16.9 million, an 85.7% improvement over the 1983 quarter. Chairman and CEO William Turner Jr. said he expected continued improvements in packaging and particularly forest products. Fraser Inc.'s net income of $4.0 million was up 92.9% compared to 1983, while sales jumped 34.6% compared to last year. After five quarters of red ink, Great Lakes Forest Products Ltd. reported a modest profit for the quarter of $206,000, compared with a loss of $7.7 million in the year-ago quarter. Sales were up 30.6%, GLFP said, with shipments up in all categories.

Red ink in the West. With its pulp and paper mills down for over nine weeks and most of its forest products plants down for four weeks due to the labor strife in British Columbia, MacMillan Bloedel Ltd. posted a loss of $17.5 million for the quarter, compared with a loss of $23.0 million a year earlier. First-quarter sales were down 6.8%. But president Ray Smith remained optimistic about the outlook for the year, forecasting a 20% increase in lumber sales and stronger markets for newsprint, pulp and containerboard.

Canfor Corp. lost $10.5 million in the first quarter, compared with a loss of $15.7 million last year, but sales rose 5.3% from 1983. The shutdown prevented a "modest profit," the company said. British Columbia Forest Products Ltd. posted a first-quarter loss of $10.7 million, with sales down 12.2% from 1983. The company lost $16.1 million in the first quarter of 1983. BC Resources Investment Corp.'s Westar Timber Ltd. unit, formerly BC Timber Ltd., reported a loss of $6.3 million, the same amount as last year.

Scott Paper Ltd. posted first-quarter earnings of $2.6 million, up 1.7% from a strong performance in the 1983 quarter.

Among forest products companies, Doman Industries Ltd. reported a loss of $2.6 million for the first quarter, compared to a loss of $1.0 million last year. Sales, however, rose 30.9% compared to the 1983 quarter. Weldwood of Canada Ltd. lost $18,000 for the quarter, up from a $1.3-million loss last year, while Whonnock Industries Ltd. posted a loss of $1.3 million, compared with a $2.0-million loss in the 1983 quarter.

TABLE 1: **Canadian paper industry results.**

	First quarter (C$000)			
Paper companies	**Sales**	**Change 1984/83**	**Earnings[1]**	**Change 1984/83**
Abitibi	C$470,800[2]	21.6%	C$10,345[2]	411.6%
B.C. Forest	171,200	−12.2	(10,700)	n.m.
Canfor	226,400	5.3	(10,500)	n.m.
Con-Bathurst	394,000	15.2	16,900	85.7
Domtar	509,000[2]	24.1	23,900	3314.2
Donohue	104,300	25.8	5,300	n.m.[3]
Fraser	130,558	34.6	4,048[2]	92.9
Great Lakes	137,100	30.6	206	n.m.[3]
MacMillan Bloedel	411,900	−6.8	(17,500)	n.m.
Rolland	68,100	30.2	2,102	24.9
Scott	61,342	3.1	2,586	1.7
Total	**2,684,700**	**12.4**	**26,687**	**n.m.[3]**
Forest products				
Doman	56,400	30.9	(2,647)	n.m.
Weldwood	150,000	8.7	(18)	n.m.
Whonnock	62,423	12.4	(1,259)	n.m.
Total	**268,823**	**13.6**	**(3,924)**	**n.m.**
Canadian total	**2,953,523**	**12.5**	**22,763**	**n.m.**

( ) = loss. n.m. = not meaningful.

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years. 2. 1983 results restated by company. 3. Not meaningful due to loss in 1983 quarter.

EXPANSIONS

Consolidated gets first twin wire

Consolidated Papers Inc. plans to rebuild No. 12 machine at its Wisconsin Rapids Div. The $15.6-million project would add 25,000 tpy of coated paper capacity.

At the wet end, No. 12 will have a rebuilt Beloit headbox and a new fourdrinier with the first twin-wire former for Consolidated. The Beloit Bel-Bond top wire is expected to improve sheet formation and reduce two-sideness. The machine will be widened 3 in. to a trim width of 125 in.

The press section will be rebuilt and 35 Voith 72-in.-dia dryers will provide needed additional drying capacity due to the machine's speedup from 800 fpm to a possible 1,800 fpm. A new GE drive will provide the increased speed. A 75% productivity increase is expected to result from the rebuild.

No. 12 machine will be shut down in early January 1985, and is scheduled to come back online on Mar. 21. After the rebuild the range of grades made by No. 12 will be expanded from the present 60- to 100-lb enamel printing papers to up to 183-lb basis weight to include cover grades and Consolidated's new Reflections (the company's newest No. 1 premium grade, made possible by the new off-machine coater installed at the Rapids Div. in 1983).

Pacific Rim the hottest growth area;

High growth rates forecast for Pacific Rim nations in this decade to benefit North American mills as the European market undergoes transition

By DAVID R. ALLAN, Associate Editor

■ Europe's nonintegrated paper mills face a shakeout in the next few years if their financially hard-pressed governments withhold monetary support. While this will eventually lead to a leaner, tougher European industry, it will also create potential investment and export opportunities for North American paper companies.

These conclusions, among others, were presented to delegates of a recent executive seminar on "Export and Overseas Investment Opportunities in Pulp and Paper," held at N.Y.'s Waldorf-Astoria Hotel. Papers were delivered by the consultants of London-based BIS Marketing Research Ltd.; the meeting was cosponsored by *Pulp & Paper* and *Pulp & Paper International*.

Such a shakeout will not necessarily mean a reduction in pulp consumption since the surviving European industry will still be making the same amount of paper. It may create new investment opportunities in small- and medium-size European companies looking for help staying afloat. Such companies—like many other European paper producers—will also be seeking closer links with pulpmakers in order to guarantee sources of supply. In some cases, however, this may reduce their reliance on market pulp.

All of the BIS speakers stressed the urgent need for North American mills to be reliable long-term suppliers in the market—which in many cases requires establishing local distribution networks and warehouses.

Another way of setting up a European distribution system would be to invest in merchant houses on the Continent and in the U.K. This could prove especially attractive for North American companies that find the number of European mills open to outside investment or purchase to be limited.

EUROPEAN MARKET. U.S. mills are already well-established as suppliers of paperboard to the European market, having about a third of the market in kraft linerboard, according to BIS's Jim Clancy. On the other hand, Clancy told delegates that share is down from almost 40% in 1975 and is unlikely to change much in the coming years because of slow U.S. capacity increases, strong domestic demand and the relative attractiveness of the Asian market.

BIS does see opportunities for U.S. mills in the area of virgin fiber-based folding boxboards and liquid packaging boards, with "an awareness of European servicing requirements necessary" in the former case and above-average demand growth seen in the latter.

As for paper, BIS's Richard Harris sees slow growth between 1982 and 1987 in European demand for major printing/writing grades, ranging from the 1%/year growth rate forecast for publishing grades and the 0.5%/year rate for "advertising and general print" end uses to the 2%/year rate for business papers. However, nonimpact printing in Europe is growing rapidly, and Harris expects to see paper use for high-speed laser printers triple in volume in the coming years.

The printing/writing areas Harris sees as most attractive for North American exporters include specialty uncoated free-sheet and coated free-sheet papers such as embossed cover and text papers and special coated papers for computer printers. Investment opportunities for North American companies include joint ventures or financial investment in medium-size specialty producers, in independent merchant houses in the U.K. and Fed. Rep. of Germany, and to a certain extent in a few large European paper companies.

SOUTHERN PINE PULPS. The North American pulp industry's prospects in Europe are still exciting, especially for southern pine pulp. BIS's Richard Cockram sees an extra 500,000 tpy of pulp of all kinds being needed by 1987, all of it to be imported. He noted, however, that Europe is turning increasingly to new suppliers in eastern Europe, Chile, Argentina and Morocco.

TABLE 1: **European printing/writing paper demand (000 metric tons).**

Sector	1982	1987e	Average growth rate (%/year)
Publishing papers	4,715	4,915	1
Advertising & general	3,335	3,410	0.5
Business papers	2,875	3,170	2
Other	575	605	1
Total	11,500	12,100	1

e—estimated.
Source: BIS Marketing Research Ltd.

Europe "mature"

The net increase in pulp consumption between 1982 and 1987 should be evenly split between bleached softwood and bleached hardwood kraft, with sulfite consumption in western Europe actually dropping by 100,000 tons.

Cockram estimates that 500,000 metric tons of southern U.S. pine were used in the European Economic Community in 1982. He believes that figure could rise to between 600,000 and 700,000 tons in 1987—or even as much as 900,000 tons if southern pine is in oversupply, as it was in the last three years, and if a correspondingly wide price differential with northern softwood opens up.

Export opportunities for Canadian pulp are not as good, with demand for northern kraft likely to remain "static at best." Cockram believes Canadian companies should look at integration possibilities.

THE PACIFIC RIM. The one overseas market that looks exciting in all areas is Southeast Asia and Oceania, with the economies of those areas expected by BIS's Gary Tilsley to grow at some of the fastest rates in the world for the balance of this decade. He predicted demand for newsprint, linerboard, printing/writing papers and pulp should grow at least 5% to 10%/year for the rest of the 1980s.

Southeast Asia and Oceania already import 315,000 metric tpy of linerboard, 420,000 tpy of printing/writing papers and 600,000 tpy of newsprint. North American companies are major suppliers in most of those areas.

In contrast, investment opportunities in that region are less attractive since most capital spending is likely to focus on rebuilds of existing small machines or installation of secondhand units. Pulp produced in these areas is frequently nonwoodpulp or wastepaper. This kind of operation won't interest most North American investors, Tilsley noted. ■

TABLE 2: **European demand for southern U.S. pine pulp (000 metric tons).**

	1978	1982	1987e
Total softwood bleached kraft pulp	4,000	4,100	4,400
Southern U.S. pine	200	500	600-900
Proportion of southern U.S. pine to total (%)	5	12	14-20

e = estimated.
Source: BIS Marketing Research Ltd.

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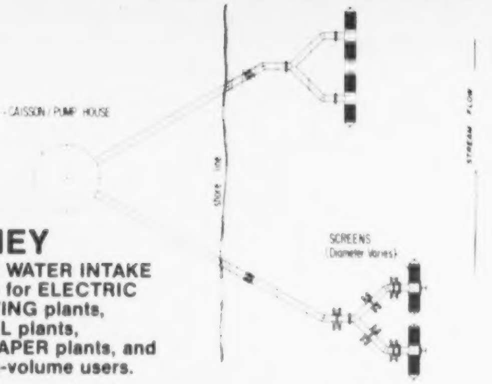

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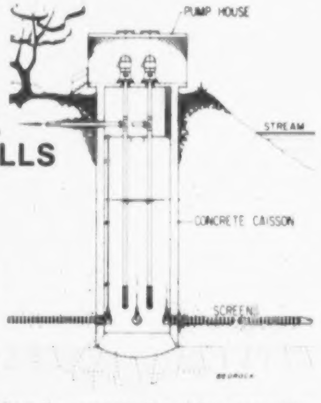

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Corrugated shipments seen rising 7% in 1984—record first quarter

But rising shipments may squeeze containerboard supplies, Fibre Box Assn. told; converters also face new quality demands from customers

By WILLARD E. MIES, Executive News Editor

■ Coming off a record 11.7% surge in first-quarter shipments, the corrugated box industry had reason to celebrate at the Fibre Box Assn. Apr. 30-May 2 annual meeting in Itasca, Ill. The meeting itself—the first large gathering to be held by the association in several years—was in a way a testimony to the industry's improving fortunes after a grim three-year span. Only last year did volume finally managed to peak above its 1979 level.

But members attending the meeting at the Hamilton Hotel were given few reasons for complacency. While corrugated box shipments may rise about 7% this year and a smaller amount in 1985, the increased demand will make containerboard supplies relatively tight, some speakers suggested. And even if they can get their raw materials, box makers will face changing customer requirements, new technology, competitive threats, and consumer legislation—forces which promise to transform industry.

BOARD SUPPLY SQUEEZE? U.S. corrugated box shipments should grow by close to 7% in 1984, hitting about 271 billion ft^2, with every quarter exceeding this year's record first quarter, according to Roger W. Stone, chairman and CEO of Stone Container Corp.

Stone predicted that real economic growth would increase at a 3.5%/year rate in 1985 and average 3% from 1986 through 1990. The current sense of fiscal responsibility in Washington will mean sustained economic growth, relatively moderate inflation rates, and a downward trend in interest rates through the remainder of the decade, he said.

Stone also predicted that by 1990 about 75 billion ft^2 more containerboard will be consumed in this country, equaling about 5.2 million tons of additional domestic containerboard consumption. The linerboard industry will also be pressed to increase exports because of continued growth in the world economy.

These numbers should be "thought provoking" to corrugated box producers since "it is very difficult to see any dramatic expansion at the mill level," Stone said. Expansion in recent years has been limited by an "almost nonexistent return on investment . . . coupled with an explosion in the cost of capital assets."

He noted that American Paper Institute capacity figures show that the industry added linerboard at an annual rate of 6.6%/year from 1960 to 1969, at a rate of 2.5% from 1970 to 1980, and at less than a 1%/year rate for 1981 to 1985. For the 1983 to 1986 period, containerboard capacity will rise 1.2%/year, but that includes a new mill, which may never be constructed.

Stone said that U.S. operating rates for linerboard should be pushing 100% at least through the end of 1986 and may be even higher. To bring operating rates down to around 90%, in excess of 2.6 million tons of capacity would have to be added at a cost of $3 billion and would not be ready to come online before the middle of 1987.

"No right-thinking businessman would spend that money unless he believed the price for linerboard in 1986 would achieve $500 to $550/ton and have a probability of remaining at that level for some protracted period of time," according to Stone.

The poor risk/reward ratio for new mill investment is one of the factors behind the increasing number of mergers and takeover attempts in the unbleached kraft industry. "Companies will increasingly be interested in buying facilities at a fraction of their replacement value. It is still far cheaper to buy good capacity in place than it is to build it."

Stone said it was hard to understand the opposition to the proposed changes in Rule 41 since these would better relate container specifications to actual performance and would also tend to increase the supply of linerboard. "It is my belief that one way or another, Rule 41 will change to respond to the needs of the marketplace rather than the needs of some producers."

CHANGING INDUSTRY STRUCTURE. The structure of the corrugated industry will change dramatically over the next ten years, Stone predicted. "Large-scale, highly productive billion-plus-square-feet container plants will be the orders of the day." This will be accomplished through the establishment of new plants with equipment such as computer-controlled continuous corrugators costing as much as $15 to $20 million and also through the lower-cost approach of modernizing existing conventional equipment.

There will be a significant reduction in conventional sheet plants, although some specialty corrugators and specialty sheet plants will continue to thrive and be highly profitable.

Stone predicted that independent corrugators will face difficulty because of the squeeze in raw material supplies. "In an industry which is 80% integrated, it is logical to assume that growth tonnage will more and more be allocated to an individual company's own consumption and the protection of its own market share."

Further encouraging this trend is the fact that centralized purchasing of corrugated containers is growing at an increasing rate. "Increasingly, orders will come from corporate buying offices."

NEW QUALITY REQUIREMENTS. Stone noted the following trends in product development and changing quality requirements:

- Better techniques to provide quality graphics on corrugated board, such as preprinted linerboard or labeling, will become increasingly important. The solution to much of this market need will be multicolor, roll-to-roll printing. Because of the high capital cost that is involved, such equipment may be located at the millsite so that printed rolls can be shipped to many plant locations. Rengo does this in Japan.

Point-of-purchase graphics on corrugated containers will become much more important, particularly in toys, housewares, and even in consumables such as beverages and snack foods. "This direction will not only encourage the development of new printing processes but will probably demand the coloring of kraft surfaces as part of its evolution."

- In addition, there will be more E flute as corrugators expand into the traditional folding carton market. "The continuing trend in retailing toward giant, self-service stores would certainly lead to this conclusion."
- Related to possible changes in transportation rules, more emphasis will be placed on special board combinations providing exceptional strength for stacking in either dry or wet conditions. Products like Stone Container's Super Stone Cor, International Paper's Anvil Board, and Owens-Illinois' Ultra-Stack, will be increasingly in demand. Board treated with chemical resins at the paper mills and in the box plants has great potential for economical strength retention in high humidity or water exposure conditions.
- In new structure, there may be more automatic bottoms, outfolds, and two- and three-piece containers.
- Growth in the use of packaging systems will mean more precision and sophistication in the production of corrugated boxes and increasing importance of quality and zero defects. Service requirements will increase as customers emphasize smaller inventories and shorter lead times. To respond to these needs, Stone Container about four years ago began a program called "IQS" for innovation, quality and service.

ECONOMIC OUTLOOK. The U.S. economic recovery is about halfway through its life cycle by historic standards, with expectations growing that the economy may peak in 1985 and then weaken. But there are some encouraging signs that suggest the typical pattern may not be repeated, according to Norma Pace, senior vice president of American Paper Institute.

TABLE 1: **Forecast of U.S. business activity (% change over year-ago levels).**

	1982	1983	1984e	1985e
Real GNP	1.9%	3.4%	5.4%	2.1%
Industrial production	8.2	6.6	10.3	3.2
Consumer prices	6.0	3.3	5.4	6.5
GNP deflator	6.0	4.3	5.1	5.7
Real consumer goods expenditures	0.1	5.5	5.6	0.3
Retail sales	2.7	9.1	10.5	5.3

e—estimated.

Although there is concern that rising operating rates will touch off a classical demand/pull type of inflation, the facts are that most post World War II inflation can be traced to cost/push, particularly in labor costs, she noted. Wage hikes are likely to continue to be moderate because of increased imports, reduced exports, and deregulation of heavily unionized transportation industries.

"The present rise in interest rates results from an escalation in private credit need since mid-1983 and a tightening in the banks' lending capacity in the second half of 1983, which resulted from the policies of the Federal Reserve." The upward pressure on interest rates will persist for another few months, and then short-term rates should begin to descend by year-end, Pace said.

Consumer confidence has been high, and retail sales will probably rise 10.5% this year following a 9.1% advance in 1983. Industrial production is forecast to increase 10.3% this year and 3.2% next year. "The output of consumer goods will moderate during 1984 and 1985, while the production of capital goods is expected to move ahead at a fast clip through 1985."

Pace forecasted that corrugated box shipments would advance 7.0% in 1984 to about 270 billion ft² and then rise 3.5% to 280 billion ft² in 1985. The forecast assumes that box demand will grow slightly faster than industrial production in customer industries (weighted by box use), which should rise 7.4% in 1984 and 2.4% in 1985.

This would begin to reverse a gradual erosion that has taken place in the relationship between output of customer inventories and corrugated box shipments. "In 1982, box demand, despite its sharp advance, remained 8% below the pre-1975 relationship between industrial production and box usage," Pace said. Reasons for this gradual market erosion include better customer cost management, new distribution systems and new packaging techniques and materials.

Pace forecasted unbleached kraft paperboard production would rise 5.7% in 1984 to 17.2 million tons and 2.3% in 1985 to 17.6 million tons. Based on revised figures recently compiled by API, capacity is forecast to rise 1.1% to 17.9 million tons in 1984 and 1.5% to 18.1 million tons in 1985. "The production requirements are quite close to practical capacity figures for both 1984 and 1985, Paced noted.

NEW MARKET OPPORTUNITIES. The shift to plastics from glass and cans may have significant market implications for the corrugated container industry, according to William Laimbeer, president of the Diversified Div. of Owens-Illinois Inc.

"The glass or metal-packed product stacked eight

TABLE 2: **U.S. fiber box shipments vs production in customer industries (% change over year-ago levels).**

	1983	1984e	1985e
Production in customer industries*	6.0%	7.4%	2.4%
Box shipments	7.4	7.0	3.5

*Represents a weighted composite of 54 industries that use boxes.
Source: American Paper Institute, Economics Dept.
e=estimated.

TABLE 3: **U.S. unbleached kraft paperboard production and capacity forecast (000 short tons).**

	1983	1984e	1985e
Production	16,250	17,180	17,581
Exports	2,163	2,250	2,450
Capacity	17,690	17,877	18,142
Operating rate (indicated) *	91.8%	96.1%	96.9%

*Calculated by *Pulp & Paper.*
e=estimated.

cases high on a pallet ten years ago needed very little vertical support from its corrugated container," he noted. "But consider the same product—a juice drink, for example—packed today in plastic or a flexible foil laminate. The demand on corrugated escalates with such a primary package," the O-I executive said.

"A box simply has to have greater stacking strength if it is to successfully carry a semirigid or flexible package to the point of purchase." Another reason for this is the concern that customers have to improve the efficiency of their warehousing and shipping systems. "With rising energy costs, getting more on a truck and stacking it higher in a warehouse has taken on greater importance because larger payloads mean better fuel utilization and higher stacking cuts the need for new floor space."

The shift to plastics in primary packaging may mean greater use of corrugated board and less use of shrink film and trays. And the Rule 41 implication is that lighterweight linerboard may not be as inevitable as it seems, Laimbeer said.

Performance characteristics should be developed for linerboard and medium that are "very different from the antiquated specs covered by Rule 41." Laimbeer said. The industry needs specs based on ring crush, tensile strength, tear and scuff resistance—not just weight.

He cited the rollstock moisture content standard developed by the now disbanded Corrugated Industry Development Corp. CID showed that the key cause of warp in corrugated board is moisture variation between top and bottom liners or across either top or bottom liner. "Any mill supplying a box plant should be able to conform to it, or at least measure up to some standard to ensure that the liners they ship you will be consistent in moisture content from roll to roll and within each roll." Laimbeer said.

A major change taking place in the corrugated box industry is the growing role of marketing. "We as an industry are moving—like it or not—from a technology- or cost- or efficiency-driven industry to a market-driven industry," Laimbeer said. "Technology, cost and efficiency are still important parts of the equation, but the main force now comes from outside the box plant or mill—the customer is now driving our industry."

RULE 41—STILL ALIVE. Fibre Box Assn. and API's Fourdrinier Kraft Board Group plan to advance a "revised" alternate proposal to Rule 41 carrier standards for corrugated containers, according to FBA executive director Tom Muldoon.

An industry proposal was rejected last year by the railroad classification committee after it ran into opposition from some containerboard producers. This time the revised proposal will probably be submitted first to the trucking industry classification committee and then advanced to the railroads, Muldoon said.

The main changes in the revised proposal were to make the method of running the bursting test the same as in the current rule and in the withdrawal of an alternate triple-wall standard. Thus, the test will still require that five or six bursts be above the specified level—rather than an average of ten tests required in the earlier proposed alternate.

The revised alternate rule will still use edge crush—which relates to compression strength—as the single most important criteria for corrugated containers. And bursting strength would still be reduced by 20% from the current 200-lb test level. But there would be no change in the weight of facings (linerboard) in the alternate, which would be in effect for a three-year trial period along with the existing rule, Muldoon explained.

Muldoon also outlined work the industry has been doing with the U.S. Dept. of Agriculture regarding the packaging of meat and poultry. The USDA's requirements have become increasingly strict in recent years even though another government agency, the Food & Drug Administration, also regulates food packaging.

Supported by the Reagan Administration's philosophy of reducing excessive government regulation, FBA, API and the Paperboard Packaging Council have been trying to convince the Dept. of Agriculture to acept the judgement of the FDA. The USDA agreed and has issued a new "simple procedure" that will become effective July 17.

Under this new rule meat and poultry packing plants would become responsible for securing guarantees from their suppliers that the packing materials comply with federal food laws and regulations. In addition, the meat inspectors will monitor these guarantees on a random basis. Previously, packaging producers had to obtain a letter of acceptance from the USDA in an increasingly elaborate and time-consuming procedure.

"All of this sounds very good," Muldoon said. "The problem arises, however, when we examine the information the USDA says should be included in each guarantee." This would include letters from suppliers stating that their materials (linerboard, adhesive, etc.) are in compliance with food and drug laws. FBA and other industry groups, however, are working with USDA to simplify the requirements.

RISING PRODUCTIVITY. U.S. shipments of corrugated and solid fiber products in March were 23.65 billion ft², 8.4% above a year earlier and the highest month for shipments in the history of the industry, according to Henry J. Daluga, FBA statistical director.

Shipments for the entire first quarter of 1984 were up 11.7% from the first quarter of 1983 and also set a quarterly record.

Last year corrugated box shipments rose 7.4% to 252.539 billion ft² from 1982 and also topped their previous peak of 250.643 billion ft² reached in 1979.

All sections of the country shared in last year's shipment gains, with the Northeast (Area 1), up 4.7%; East (Area 2), up 11.1%; East Central (Area 3), up 8.6%; North Central (Area 4), up 8.4%; South Central (Area 5), up 6.8%; and West (Area 6), up 5.8%. The smaller gain in the Northeast reflected higher shipment levels in 1982 because of a Canadian industry strike, Daluga noted.

The FBA's corrugated price index for the first two quarters of 1982 stood at 229, then began a steady decline through the first quarter of 1983. The index then went up in the second quarter of 1983 before going back down in the third quarter. In the fourth quarter of 1983 the index registered a gain of almost 8 points, ending the year at 225. The index gained 2.2% in the first quarter of 1984 to 230 vs a 1.1% rise in the producer price index.

The average weight of corrugated board has been increasing and in 1983 averaged 138 lb/1,000 ft² compared with 136 in 1970. "This ties in with the fact that our growth in recent years has been in packaging of heavier products and that where we lost volume to competing materials has been in lighter grades," Daluga said.

The percentage of industry production consisting of double wall and triple wall bears out this change in basis weight, he noted. In 1983, 8.6% of industry output consisted of double and triple wall compared with 7.3% in 1970 and 5.4% in 1960. The pattern of end uses for corrugated boxes in 1983 did not show much change from prior years. Food and beverage industries are still far and away the largest users of corrugated boxes at 38.0%, followed by the paper industry at 12.9%, stone, clay and glass at 7.1%, and chemicals at 6.7%.

The total number of employees in the corrugated box industry did not change very much in 1983, rising 0.8% from 59,100 in 1982 to 59,600 in 1983. This resulted in a significant increase in productivity because of the large increase in box shipments. Employee hours per 1,000 ft² went from 0.50 hours in 1982 down to 0.47 hours in 1983, while labor costs only rose from $4.67/1,000 ft² in 1982 to $4.84, an increase of 3.6%.

The productivity improvement was due partly to heavy investment in new equipment—i.e., continuous-run corrugators, direct-drive knives, splicers, stackers—and more efficient downstream presses and die cutters.

ROLE OF THE INDEPENDENT. The new technology is leading to higher volume per plant and a drop in the total number of plants in the industry. The average converting plant in 1979 produced 402 million ft², while in 1983 it produced 430 million ft². The total number of plants dropped from 1,460 in 1979 (649 converters with corrugators and 811 sheet plants) to 1,370 plants in 1983 (614 converters and 756 sheet plants), said Daluga.

Not surprisingly, independent box makers said they would continue to play an important role in the industry in future years. Charles S. Wolf, president of York Container Co., cited statistics showing the number of independent box plants had risen from 117 in 1974 to 126 currently, while their share of total box shipments had increased from 21.9% in 1974 to 23.6%. He predicted that the independents' share of the market will grow to 25% in the years ahead. ■

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Matt Coleman *is engineering editor for* Pulp & Paper. *Comments should be addressed to him at:* Pulp & Paper, *2700 Cumberland Parkway, N.W., Suite 530, Atlanta, Ga. 30339.*

Survey examines the typical engineer

Engineers in the paper industry resent being stereotyped. They don't like the image of a somewhat eccentric, strangely dressed slide rule jockey, good at numbers but not necessarily the English language. Most take their jobs seriously and feel they play a vital role in keeping the industry progressive and efficient.

Typically, engineers see themselves as conservative individuals who are logical, analytical, practical, factual, creative, and oriented toward math and computers. They believe that engineers have a well-rounded education, understand the business side of the industry, work well with people, and have management potential. But nonengineering employees don't agree with many of these perceptions.

Basically, these are the results of an engineer profile survey which ran in the May 1984 Engineer to Engineer column (*P&P*, May 1984, page 159). The first part of the "quiz" was actually conceived as a tongue-in-cheek look at engineers, but several questions obviously touched on subjects of genuine concern to most respondents. Several hundred questionnaires were returned, and the high level of response is sincerely appreciated.

The first part of the survey was a true/false section dealing with various engineering characteristics. Figure 1 shows the typical response of both engineers and nonengineers.

(Continued on next page)

FIGURE 1: **Typical response from engineers and nonengineers.**

	Engineers		**Nonengineers**	
Engineers:	**True (%)**	**False (%)**	**True (%)**	**False (%)**
1. Are good at math	96	4	92	8
2. Like to work overtime	27	73	33	67
3. Wear a calculator on their belt	5	95	42	58
4. Understand machinery	92	8	92	8
5. Like computers	83	17	75	25
6. Are conservative	85	15	83	17
7. Are liberal	14	86	25	75
8. Are logical	96	4	75	25
9. Are concerned with detail	87	13	83	17
10. Always wear pocket protectors	17	83	58	42
11. Wear white socks	11	89	42	58
12. Wear plaid shirts and striped ties	6	94	42	58
13. Make the best managers	36	64	25	75
14. Make terrible managers	21	79	25	75
15. Took harder college classes than business majors	92	8	67	33
16. Have poor communication skills	29	71	67	33
17. Are analytical	97	3	83	17
18. Don't see the "big picture"	25	75	50	50
19. Are practical	90	10	75	25
20. Are picky	64	36	75	25
21. Don't understand the business side of the paper industry	28	72	67	33
22. Work on their own cars	62	38	67	33
23. Work with facts	98	2	83	17
24. Don't work well with people	12	88	50	50
25. Take chances	43	57	33	67
26. Are creative	82	18	42	58
27. Don't have a "rounded" education	25	75	58	42
28. Are condescending to nontechnical people	31	69	58	42
29. Play a vital role in keeping industry progressive and efficient	97	3	67	33

DIFFERING VIEWS. Engineers and nonengineers generally agreed on many of the characteristics, but not those in true/false Nos. 10, 16, 21, 24, 26, 27, and 28. This is interesting in that engineers seem to be unaware of some impressions they give to nonengineers. How these impressions are formed is beyond the scope of this survey, but responses to several questions possibly provide an indication.

For example, Question 28, concerning whether engineers are condescending to nontechnical people, drew a 69% false response from engineers, but 58% of the nonengineer employees felt it was true. Why nonengineers may feel this way, again, could not be explored in such a limited survey. But the fact that 92% of the engineers thought they took more difficult courses in college than business majors, for example (No. 15), could be typical of the engineering characteristic that nontechnical people consider "condescending," particularly if engineers overtly make a point of it. Interestingly, nonengineering personnel agreed with engineers on this question, but to a significantly lesser degree (only 67% marked true).

Engineering and nonengineering types may also have differing views on what is important to the successful operation of a business or industry—the knowledge and the training that comes with perhaps taking "harder" technical courses in college, or the more subjective, but critical, "arts" such as communications. Assuming that nonengineers consider good communication skills important in their business, 67% thought engineers were deficient in this regard (No. 16). Engineers (71%) disagreed.

The fact that nonengineers also disagreed overwhelmingly with engineers on the questions of well-rounded education (No. 27), understanding the business side of things (No. 21), being creative (No. 26), and working well with people (No. 24), further indicates that engineers may not be fully attuned to impressions they make on their nontechnical peers.

Most respondents played it straight on questions relating to personal eccentricities of engineers. However, reported observations by many people, including this editor, are that, at least around some engineering offices, pocket protectors, white socks with black shoes, and other forms of personal expression appear more often than is believed. Some respondents caught the lighter side of these questions, but a few were upset. However, nonengineers do notice those pocket protectors.

FIGURE 2: **Most important in day-to-day operations of a pulp and paper mill.**

(1 is most important; 6 is least important)

	Engineers	**Nonengineers**
1.	Operators	Operators
2.	Maintenance/ technicians	Superintendents
3.	Superintendents	Maintenance/ technicians
4.	Engineers	Engineers
5.	Mill manager	Mill manager
6.	Accountants/ financial	Accountants/ financial

MIXED RESPONSES. Since many respondents (40%) were engineers in management roles, with another 20% to 28% being project engineers or in supervisory jobs where people skills are needed, the mixed responses on best/worst manager questions (Nos. 13, 14) were expected. Engineers don't make the best or the worst managers since like every other group they fall somewhere in between. Not surprisingly though, management training for improving people skills rated higher than learning computer skills in the continuing education section.

Results from the survey's second section, covering the position rankings for day-to-day mill operations, are shown in Figure 2. The mill manager and the fiduciary set don't do well in anyone's eyes as far as day-to-day operations are concerned. Both group's views were very close.

Figure 3 shows the interest levels of engineers for additional education (section three of the survey). Continuing education that can be of immediate benefit (computer training, management development) ranked the highest, with a surprisingly equal response for an M.S., liberal arts, crossover B.S., or accounting degree. The need for specialty programmers familiar with the papermaking processes is increasing in the paper industry, thus the software category received a high response. Most engineers are familiar with how difficult it is to get specialty software written for any sort of automated control system. Increasing use of small and portable computers in the mill makes computer programming for professionals an important skill.

Management training and an M.B.A. are perennial favorites for people trying to escape the "engineering ghetto," as this survey showed. The strong interest in additional education is interesting considering the respondents were 95% trained engineers. Some topics added to the list include flying, music, P.E. license, and psychology.

FIGURE 3: **Subjects engineers would like additional education in.**

64%	Management training (people skills)
63%	Computer software/languages
41%	Computer hardware
37%	M.B.A. program
20%	Accounting/business
19%	Crossover degree in another engineering field
18%	M.S. (or advanced degree) in your field
18%	Writing/literature/liberal arts

Additional comments and responses to this column or on any engineering topic are always welcome. Please send them to:
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Sodium hydrosulfite markets show modest recovery

By BARRY SHOCKETT

As predicted, the U.S. domestic market for merchant sodium hydrosulfite recovered somewhat in 1983 and should increase, about the same amount in 1984 (about 10%). Both imports and exports are also expected to rise this year—to 3,000 and 17,500 tons, respectively—up from 1,200 and 16,900 tons in 1983.

Canada continues to be dependent on imported sodium hydrosulfite for both merchant product and the Borol precursor for onsite production. Virchem Canada has built a new formulating facility in Jonquière, Que., replacing its Moncton, N.B., operation.

U.S. statistics, sodium hydrosulfite[1] (000 short tons)

	1981	1982	1983	1984e
Nameplate capacity	73.5	61	67	74
Production	71	60	66	70
Imports	0.3	3.2	1.2	3
Exports	15.6	17.7	16.9	17.5
Apparent consumption	55.7	45.5	50.3	55.5
Pulp and paper	16.7	16.7	17	17.5

1. Not including onsite production via Borol.
Sources: Bureau of Census, Dept. of Commerce; *Pulp & Paper* and industry estimates.

Canadian statistics, sodium hydrosulfite[1] (000 short tons)

	1981	1982	1983	1984e
Imports[2]	8.3	7.6	10.1	10.5
Total demand[3]	8.3	8.2	8.3	9.5
Pulp and paper	7.2	7.1	7.4	8.4

1. Not including onsite production via Borol. 2. No sodium hydrosulfite is produced commercially in Canada. 3. Not including inventory changes.

SODIUM HYDROSULFITE

UNITED STATES

Uses: Sodium hydrosulfite is used as a bleaching agent for mechanical and deinked pulps. The textile industry is the largest consumer. Other enduse applications of sodium hydrosulfite include kaolin clay bleaching and specialty chemicals.

Demand: Despite the growth in total domestic demand for merchant hydrosulfite in 1983, pulp and paper usage last year increased only 2% to an estimated 17,000 tons. (Mill usage had remained flat during 1981 and 1982.) Additionally, an estimated 8,800 tons (100% basis) of hydro were produced onsite by the mills via the Borol process. Pulp and paper's share of the merchant market dropped slightly in 1983 to 34% from the 36.5% accounted for in the previous year. Exports last year were at the 17,000-ton level, about 4% to 5% under the 1982 figure.

Sources: The remaining two sodium hydrosulfite producers in the U.S. are Olin (two plants) and Virginia Chemicals (three plants). Virginia Chemicals is completing major expansion programs this year at its Bucks, Ala., and Leeds, S.C., facilities. Morton-Thiokol's Ventron Div.is still the sole supplier of Borol solution to mills.

Availability: The capacity expansions by Virginia Chemicals will ensure adequate supplies for the foreseeable future. 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: The 60¢/lb list price for merchant sodium hydrosulfite, originally posted on Dec. 1, 1981, has remained in effect throughout 1982 and 1983, as well as for the first half of 1984. Pricing history: 1983, proprietary blends, 60¢/lb, f.o.b. producing point; 1982, 60¢/lb, 1981, 55¢-60¢/lb; 1980, 43.5¢-55¢/lb.

Forecast: As the economy continues to recover, pulp and paper usage of merchant sodium hydrosulfite should increase modestly this year between 2% and 3%. Total merchant demand is expected to reach the 55,500-ton level, so the pulp and paper industry's share will drop to about 31.5%.

CANADA

Uses: Sodium hydrosulfite is used mainly by newsprint and groundwood-specialties mills to bleach mechanical pulps. The other minor enduse is for vat-dyeing of cotton.

Demand: In 1983, an estimated 7,400 tons of merchant sodium hydrosulfite (100% basis) were used by the pulp and paper industry out of a total demand of some 8,300 tons. On a 100% basis, about 17,400 tons of hydro were produced onsite by mills in 1983 via the Borol process.

Sources: Virchem Canada is the major supplier to pulp and paper mills with sodium hydrosulfite imported from its U.S. parent. Several distributors bring in hydro from offshore sources. Imports from Morton-Thiokol's Ventron Div. supply Canadian mills with Borol solution.

Availability: The Canadian market is relatively small, and thus no shortages are likely in the foreseeable future. 1983, market; 1982, market; 1981, market; 1980, market.

Pricing: Continued pricing adjustments for exchange purposes raised the price of blended sodium hydrosulfite to C72¢/lb (up a penny) on Apr. 1 of this year. The nonblended product was listing at the June 1, 1983 price of C68¢/lb. Pricing history: Blended: 1983, C69.4¢-71¢/lb; 1982, 64¢-69.4¢/lb; 1981, 59¢-64¢/lb; 1980, 51.4¢/lb; 1979, 50.5¢/lb. Non-blended: 1983, 61¢-68¢/lb; 1982, 61¢-71.5¢/lb; 1981, 66.4¢-71.5¢/lb; 1980, 56¢-66¢/lb; 1979, 47.5¢-56¢/lb.

Forecast: Both total demand and pulp and paper usage of merchant hydrosulfite are expected to increase in 1984. Mills should employ 8,400 tons (100%) out of a total consumption of about 9,500 tons. An additional 1,200 tons of Borol solution (12%) will be required by the mills this year, bringing 1984 consumption to 10,300 tons.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

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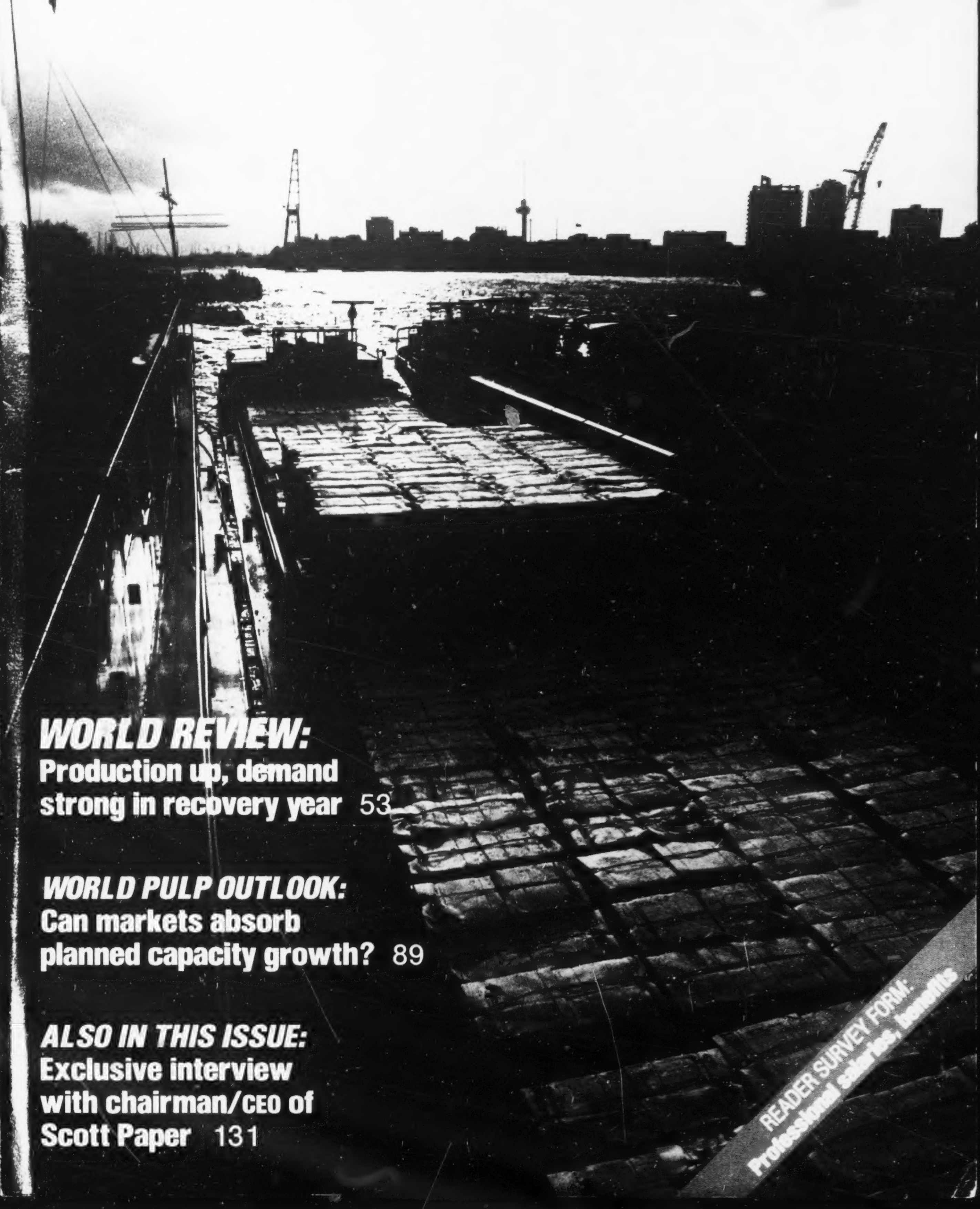

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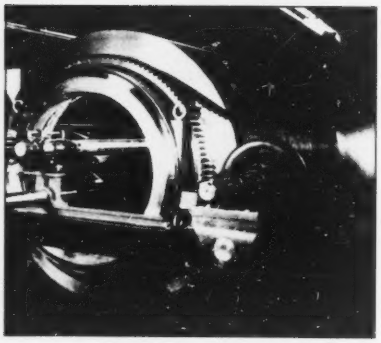

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COVER: *In Rotterdam, barge loaded with Canadian market pulp destined for European mills reflects the international marketing network of today's pulp and paper industry. (Photo courtesy of British Columbia Forest Products Ltd.)*

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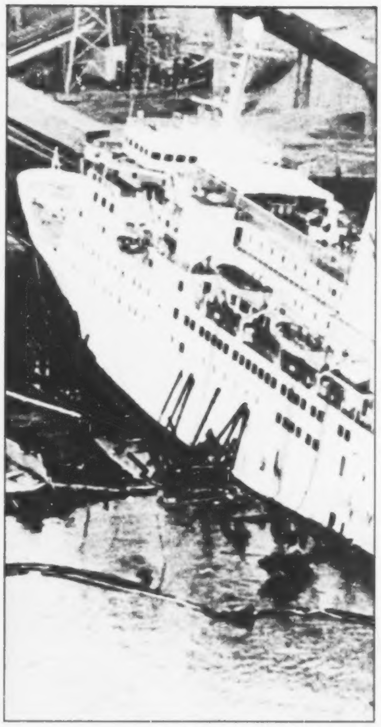

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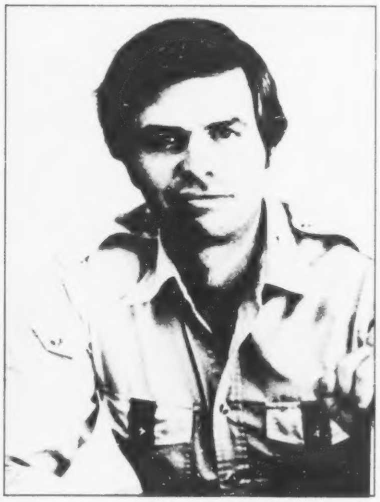

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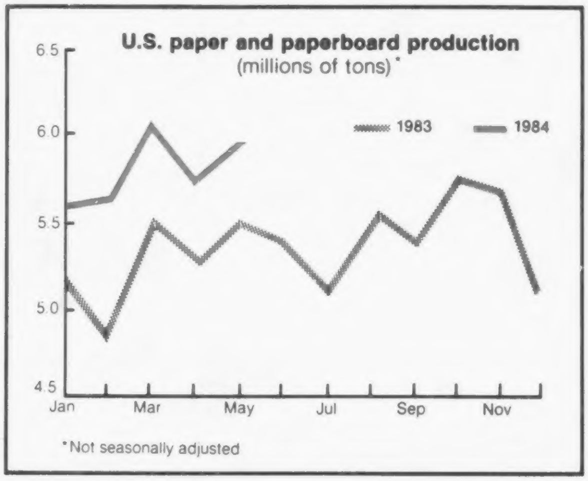
MONTH IN STATISTICS

U.S. paper and paperboard production continued at the 68-million-tpy rate in May 1984 and, according to the available weekly data, in June as well, reports the American Paper Institute. Total paper production in the first half of 1984, at an estimated seasonally adjusted rate of 34.3 million tpy, was about 7.5% above the total for 1983. The estimated seasonally adjusted rate of paperboard production for the first half was 34.0 million tons, about 9% above the comparable 1983 rate but 5.5% above the average for all of 1983.

Among major grades, printing papers and other packaging and industrial papers continued to show the largest gains. Newsprint has picked up strongly—the January-May 1984 period was nearly 9% over the same 1983 period. Containerboard production for domestic use in the five-month period was 12% above the 1983 level. Setup boxboard continued its unusually strong performance, showing an 18% gain.

Canadian newsprint shipments were up a strong 24.5% in May compared with the same month in 1983 and rose 8.9% for the January-May period compared with the 1983 period. Operating rates in May were 99% vs 85% in May a year ago.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	May	481	9.3	5,604	8.6
Uncoated groundwood (s)	May	134	0.8	1,608	9.4
Coated paper (s)	May	532	15.2	6,223	16.5
Uncoated free sheet (s)	May	773	5.5	9,313	7.2
Unbleached kraft packaging and industrial (s)	May	330	8.6	3,984	7.2
Tissue	May	412	1.7	4,884	2.7
Total paper	**May**	**2,959**	**7.4**	**35,130**	**8.8**
Kraft linerboard, unbleached	May	1,429	8.4	16,186	9.2
Semichemical medium	May	435	4.8	5,169	12.0
Bleached paperboard	May	350	2.3	4,119	4.2
Recycled paperboard	May	693	12.3	8,244	13.4
Total paperboard	**May**	**3,019**	**8.3**	**34,896**	**10.1**
Total paper and paperboard[5]	**May**	**5,979**	**7.9**	**70,026**	**9.4**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	April	4,722	10.3	55,897	8.6
Market pulp production	April	593	10.4	6,862	9.5
Wastepaper consumption at paper/board mills	April	1,325	13.8	15,847	11.1
Pulpwood consumption (cords)	April	7,344	2.5	88,452	4.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	May	23.001	11.0	112,664[6]	10.7
Containerboard inventories at box plants	May	2,512	2.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	April	833	19.2	10,295	25.8
Imports of Canadian newsprint	April	560	6.3	7,211[6]	13.8
U.S. paper exports (including products)	April	353	−9.9	4,282	−2.9
Exports of unbleached kraft linerboard	May	187	−7.9	2,073	−10.9
Exports of woodpulp	April	249	−28.3	3,599	1.4
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	May	850	24.5	3,569[6]	8.9
Operating rates	May	99%	85%	88%	82%
Inventories held by U.S. consumers	May 30	1,266	5.7		
Woodpulp shipments (export only)	May	605	15.2	2,525[6]	−1.9
Operating rates	May	97%	82%	78%	81%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

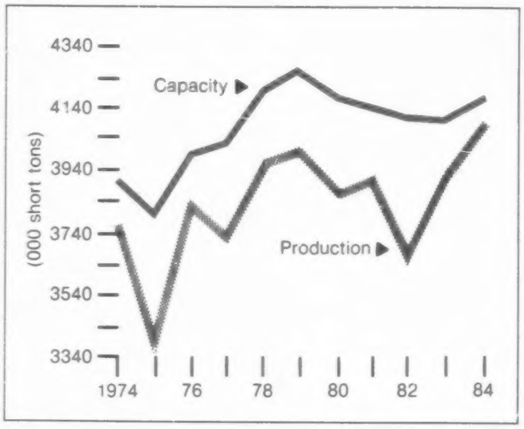
Bleached paperboard: Limited capacity will tighten market

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons	3,665	3,918	4,100
Capacity, 000 tons[1]	4,123	4,100	4,166
Utilization rate, %	88.9	95.6	98.4
Imports, 000 tons	—	—	—
Exports, 000 tons[2]	516	525	500
Apparent U.S. consumption			
000 tons	3,149	3,393	3,600
lb/capita	27.11	29.00	30.45
000 tons/$ billion real GNP (1972)	2.11	2.21	2.21

e=Estimated.

[1] Because of grade switching, capacity utilization is difficult to define.

[2] API production for export.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	**Capacity share** (%)
1. International Paper	780	19.0
2. Potlatch	522	12.7
3. Continental Forest Industries	430	10.5
4. Westvaco	415	10.1
5. Federal Paper Board	330	8.0
6. Temple-Eastex	310	7.6
7. Champion International	265	6.5
8. James River	212	5.2
9. Weyerhaeuser	200	4.9
10. Gulf States Paper	180	4.4
11. Container Corp. of America	162	3.9
12. Gilman Paper	160	3.9
13. Georgia-Pacific	160	3.9

U.S. capacity (1984): **4.100 million short tons**
Capacity share of top five companies: 60.4%
Capacity share of top ten companies: 88.9%

GRADE STRUCTURE: Folding carton and milk carton stock are the primary uses for solid bleached sulfate (SBS) paperboard. Some SBS is also used for linerboard, corrugating medium, printing boards, and cups, plates and trays. Bleached boards are available in basis weights ranging from 120 to 300 lb/3,000 ft², calipers usually range from 10 to 28 pt. in low-medium- and high-density levels. About half of the tonnage is coated.

PRODUCTION/CAPACITY: Production of bleached board was up 6.9% in 1983 to 3.92 million tons after a drop of 6.3% to 3.67 million tons in 1982. As a result, operating rates increased from 88.9% in 1982 to 95.6% last year—their highest level since 1976 when the rate was 96%. Exports also were up in 1983, by 1.7% to 525,000 tons.

The increase in operating rates last year was not only due to the improved U.S. economy, but also due to a decrease in capacity by 3% to 4.1 million tons. The increase in running time was even more sharply improved in 1983 than is apparent from the figures due to machines being swung back from production of bristols, board, and market and fluff pulp. In 1982, some SBS capacity was switched to making these alternate grades due to the depressed condition of the folding carton market.

OUTLOOK: SBS markets should be tight during the next two years, with capacity increases expected to be less than 3%. Demand should not improve very much for most end uses.

Capacity should increase just 66,000 tons this year, and 89,000 tons through the next two years, reaching 4.255 million tons in 1986, according to American Paper Institute's latest survey. That figure should be adjusted upward by about 175,000 tpy because of plans announced by Westvaco earlier this year to install a new SBS machine at Covington, Va., which is scheduled to startup in 1986.

Production is expected to rise about 4% in 1984 and 2% to 3% in 1985, lifting operating rates to the 97% to 98% range. Demand for folding carton, milk carton, and cup and plate stock will remain relatively flat. SBS could continue to lose market share to clay-coated recycled and unbleached kraft board, although statistics indicate that this trend appears to be reversing. Erosion in domestic milk carton stock consumption also appears to be turning around, thanks to an industry consumer awareness campaign stressing the nutritional value of milk in paperboard cartons. Domestic milk carton stock use was up 1.9% last year, halting a long decline caused by inroads from plastic one gallon containers.

PRICING: Following a deterioration in pricing in late 1982, the industry began to recover during the second half of last year with attempts to return to the mid-1981 list of $625/short ton for 15-pt coated SBS folding carton board in rolls. Discounting continued, however, keeping some transaction levels well below list.

By the second quarter of 1984, the market had strengthened sufficiently to prompt more attempts to increase prices, but the extent of the hike varied greatly with posted increases of $15 to $37.50, which brought list levels to a range of $570 to $662. By mid-year, however, the price gap had narrowed somewhat to around $600 to $662. But discounting continued into the second half of the year, keeping actual prices somewhat below posted levels.

Approximate price history for 15-pt coated SBS folding carton board in rolls in year-end quotes of $/short ton: 1973, $300; 1974, $360; 1975, $360/365; 1976, $385; 1977, $405; 1978, $425/445; 1979, $490; 1980, $550; 1981, $625; 1982, $590/625; 1983, $590/625; mid-1984, $600/662.

(News section continues on page 23)

ACQUISITIONS/MERGERS

Merger marketplace is lively

By mid-July some dust had settled on apparent acquisition tussles over three companies with forest product interests—Southwest Forest Industries Inc., Continental Group Inc., and St. Regis Corp. The outcome was mixed: one attempted merger failed, one was successful, and one appeared to be developing into a full-scale brawl.

St. Regis is reportedly prepared to wage a serious fight if two companies controlled by Australian publisher Rupert K. Murdoch attempt a takeover. Murdoch, who purchased 5.6% of St. Regis's shares in late June, has said he is only interested in St. Regis as an investment opportunity, but several events have indicated otherwise.

On July 9 St. Regis filed a suit claiming Murdoch had "embarked on a secret effort" to raise money to buy 50.1% of the company for as much as $55/share. Murdoch, according to the suit, met with bankers in London, U.K., the previous week, attempting to raise a $750-million credit line for a possible takeover of St. Regis. Murdoch was said to have estimated the gross value of St. Regis, a forest products and packaging concern with interests in insurance and energy, at $3.6 billion to $3.8 billion.

The suit alleged that Murdoch had made "patently false statements" regarding his investment intent in public filings after he had purchased the 5.6% share. In his original Securities & Exchange Commission filing, Murdoch said he did not have "any present intention to acquire control of the company." On July 10 a federal judge in Dallas, Texas, sided with Murdoch and denied St. Regis's request for a temporary restraining order barring Murdoch from acquiring any additional shares. A court hearing on the suit is scheduled for Aug. 9, however.

Separately, Murdoch was expected to file an amendment to his original SEC filing. According to Murdoch's lawyer, the amendment would confirm reports that Murdoch has been trying to line up funding for the possible purchase of additional shares of St. Regis.

Murdoch has refused a request by St. Regis chairman, William Haselton, to sign an agreement that he would not purchase any additional shares. St. Regis believes, however, Murdoch may not be able to acquire more shares—the Florida insurance commissioner has ordered Murdoch to refrain from buying more shares because of his failure to give proper notice of his original purchase.

But St. Regis was said to be expecting a tender bid from Murdoch at any time and organizing ways of fighting one. Company executives are considered to be strongly against any takeover efforts. Last year the company bought 8.6% of its stock for about $160 million from an investment group led by Sir James Goldsmith. And one effect of the company's planned acquisition of the Colonial Penn Group, valued at $590 million, is that a takeover would be more costly.

"St. Regis can best serve its shareholders and its customers by continuing as an independent corporation," said St. Regis's Haselton. The company "will not be distracted nor sidetracked from consummating as expeditiously as possible the two major transactions now on the table"—the sale of the Monticello, Miss., linerboard mill and 16 container plants to Georgia-Pacific Corp.

Continental Group's situation, in contrast with St. Regis's, has been mostly settled. On June 29 the company said its board had approved a merger agreement with a corporation owned 80% by Peter Kiewit Son's Inc. and 20% by Murdoch Investment Corp. for $58.50 in cash per share of common stock. The company said the total value of the transaction would be about $2.785 billion.

Peter Kiewit Sons is a private mining and construction company owned solely by its employees and headquartered in Omaha, Nebr. Murdoch Investment Corp. is owned by David H. Murdoch, a private investor with a major interest in Occidental Petroleum Corp.

S. Bruce Smart, chairman and CEO, said that the proposal by the Kiewit-Murdoch group was the highest price among several alternatives, was not subject to any financing contingencies, and would leave unchanged Continental's present employee compensation policies. The group "emphasized its intent to continue Continental Group as an independent viable operating company," Smart said.

"It is their desire to retain as many of our businesses as possible, but over time some assets may be divested consistent with plans previously under consideration by current management," Smart said. Smart said he believes Kiewit and Murdoch will keep the insurance operations and the packaging and pipeline operation.

Early in June Continental had received an unsolicited merger offer from a company controlled by British financier Sir James Goldsmith (*P&P*, July 1984, p. 25). But Goldsmith's final offer was said to be 50¢/share lower than the winning offer. Tenneco Inc. also reportedly made an offer that was very close to the Kiewit and Murdock bid.

Southwest Forest appears to be interested in a merger, but only in the right one. The company terminated discussions July 9 with Jefferson Smurfit on a possible takeover. Smurfit said it had offered $24/share, or $316.8 million, for all outstanding stock and obtained a $550-million line of credit from a group of commercial banks, but Southwest Forest ended the talks, citing "significant uncertainties" about Smurfit's ability to finance a merger promptly. Smurfit felt the credit line was sufficient to effect the merger, refinance existing debt, and provide working capital.

Smurfit had acquired 9% of Southwest Forest's shares in May and was believed to be interested in further expanding into the U.S. packaging company (*P&P*, July 25, p. 25).

Several months ago Southwest Forest had agreed in principle to a $24/share leveraged buy-out and debt restructuring by president and CEO, W.A. Franke, but ended the plan because of concerns over financing.

Sales and earnings in 1983.

Company	Sales	Change 1983/82	Earnings	Change 1983/82
St. Regis	$2,774,578	8.6%	$ 55,181	22.5%
Southwest Forest	636,415	19.2	(29,821)	n.m.
Continental	$4,820,000	− 3.8	199,000	10.6

(   ) = Loss. n.m. = Not meaningful.

CAPACITY

Groundwood papers to lead expansion

Canadian newsprint capacity will remain flat in the 1983-86 period, and market pulp capacity will increase at just 1.2%/year, while groundwood specialties and book and writing papers lead the industry in expansion. These were among the results of the Canadian Pulp & Paper Assn.'s annual capacity survey, which has just been released.

The fastest growth rate expected for the entire Canadian industry—excluding the continued trend toward thermomechanical pulp at newsprint mills—is in printing and writing papers, with annual rises of 5.7% forecast. By contrast, "other paper" should go up just 1.5%/year and containerboard and boxboard an average of 2.0%/year each.

These rates are higher than the 1973-83 average, with printing and writing papers having gone up 5.3%/year in the last decade, other paper just 0.9%/year, containerboard 1.3%/year and boxboard 1.6%/year. The overall growth rate is being held down in comparison with the last decade by the flat trend of newsprint (after an 0.9%/year performance in 1973-83) and building paper and board (which came off of a 0.5%/year record over the last 10 years).

Annual capacity of Canadian pulp and paper industry, 1983-86 (000 metric tons).

Market pulp	**1983**	**1984**	**1985**	**1986**
Dissolving and special alpha	201	214	222	227
Sulfite paper grades	378	354	387	389
Sulfate paper grades	6,644	6,740	6,690	6,782
Bl. softwood	5,203	5,275	5,257	5,399
Semibl. softwood	453	446	443	441
Bl. hardwood	780	799	765	717
Unbl.	208	220	225	225
Total chemical paper grades[1]	**7,022**	**7,094**	**7,077**	**7,171**
Increase from previous year	182	72	−17	94
	2.7%	1.0%	−0.2%	1.3%
Mechanical	418	527	527	527
Total market pulp capacity	**7,641**	**7,835**	**7,826**	**7,925**
Increase from previous year	24	194	−9	99
	0.3%	2.5%	−0.1%	1.3%

1. Excluding dissolving and special alpha.

Paper and board				
Newsprint	9,970	9,935	10,000	9,970
Groundwood printing	800	840	935	960
Book, writing, misc.	1,026	1,118	1,182	1,198
Kraft papers	554	555	558	564
Special papers	37	37	37	37
Containerboard	1,794	1,870	1,894	1,905
Boxboard	767	787	800	814
Total	**15,397**	**15,603**	**15,891**	**15,935**
Building, other	751	750	751	752
Total paper, board capacity	**16,148**	**16,353**	**16,642**	**16,687**
Increase from previous year	112	205	289	45
	0.7%	1.3%	1.8%	0.3%

Source: Canadian Pulp & Paper Assn.

Market pulp growth rates of 2.3%/year in the last decade will slide to 1.2%/year in 1983-86 due to a sharp drop in bleached and semibleached kraft growth (down to 0.6%/year from 3.1%/year) and an acceleration of unbleached sulfite's fall (now dropping at 4.9%/year, compared with 2.3%/year in the previous period).

But most other market pulp grades in this survey look better than in the last decade: unbleached kraft, growing at 2.7%/year, after a 4.2%/year drop; bleached sulfite, going up 2.2%/year, after falling 0.8%/year; and dissolving and special alpha, up 4.1%/year, after a 7.0%/year tumble.

Market pulp. Market pulp capacity will rise just 284,000 metric tons during the 1983-86 period, to 7.9 million tpy, and 109,000 tons of that increase will come from mechanical pulp. (The mechanical pulp rise is deceptive since it reflects the conversion of Consolidated-Bathurst Inc.'s Bathurst, N.B., mill from chemical to thermomechanical pulp—even though the resulting pulp is intended for shipment to Con-Bath's Bridgewater newsprint mill in the U.K.)

Paper-grade sulfate market pulp will rise just 138,000 tons, or 2.1%, during the entire period. The 0.7%/year rate this implies is just a quarter of the 1973-83 rate. However, bleached softwood kraft is rising by 196,000 tons, or 3.8% over the period, due to conversions by several mills from bleached hardwood.

Total pulp. Pulp capacity for all grades should rise by 3.5% to 24.2 million tpy by the end of 1986, maintaining the growth rate of the last 10 years. Expansions at E.B. Eddy Forest Products Ltd.'s Espanola, Ont., mill, at Northwood Pulp & Timber Ltd.'s Prince George, B.C., mill, and Western Pulp Partnership Ltd.'s Squamish, B.C., mill account for the planned increase in bleached kraft pulp. Rebuild of Fraser Inc.'s Atholville, N.B., mill is boosting bleached sulfite, while expansions at Tembec Inc.'s Temiscaming, Que., installation and Western Pulp's Port Alice, B.C., mill will increase dissolving/special alpha.

Newsprint. Newsprint capacity will fluctuate within a range of 65,000 tons during the survey period, ending 1986 at the same 9.97-million-ton level as it began the period in 1983. Machine shutdowns and upgrades to groundwood specialties should offset replacements and modernizations.

Groundwood specialties. Conversion of newsprint machines to uncoated groundwood at three mills will boost capacity for groundwood specialties by 20.5%, or 160,000 tons. The three mills are Abitibi-Price Inc.'s Beaupre, Que., facility, MacMillan Bloedel Ltd.'s Port Alberni, B.C., mill, and St. Raymond Paper Ltd.'s Chute Panet, Que., mill.

Book, writing, sanitary papers. An even larger increase is represented by book and writing papers, although this is from a higher base than groundwood specialties. Book and writing capacity will rise by 172,000 tons, or 16.8%. In the sanitary paper area, capacity will rise by 8.5%, or 38,000 tons.

Paperboard. Miscellaneous improvements and mills will be responsible for the 11.4% increase, to 361,000 tons, for folding boxboard (excluding solid bleached). Recycled corrugating medium capacity is expected to rise by 27.4%, or 32,000 tons, while recycled liner goes up 5.6%, or 16,000 tons, and kraft liner rises 5.2%, or 45,000 tons.

CAPITAL SPENDING

U.S. papermakers to boost 1984 outlays

Enjoying high operating rates and greatly improved earnings, U.S. papermakers have again revised their 1984 capital spending plans upward, according to a recently released Commerce Dept. survey conducted in April and May.

Paper companies now plan to spend a record $7.17 billion in 1984 on new plant and equipment, up 16.0% from 1983 spending of $6.18 billion, according to the Commerce Dept. The previous survey, conducted in January and February, showed the paper industry planning to spend $7.13 billion in 1984, up 15.4% from last year. In a second recently conducted survey, McGraw-Hill Economics forecast U.S. paper industry outlays of $6.67 billion in 1984, up 7.9% from 1983.

Record spending plans. Spending for new plant and equipment at U.S. paper mills reached a seasonally adjusted annual rate of $6.93 billion in the first quarter, the Commerce Dept. reported. Spending is expected to increase to an annual rate of $7.20 billion in the second quarter, $7.13 billion in the third, and $7.42 billion in the fourth, easily surpassing the old mark. Industry expenditures peaked in 1980 at $6.80 billion before dropping during the recession to a low of $5.97 billion in 1982.

Canadian recovery. Canadian producers have recovered sufficiently to plan a modest increase in capital spending for 1984, according to a Statistics Canada survey completed in February. Canadian paper companies reported plans to spend C$1.09 billion this year, up 2.8% from 1983. Recovering much slower from the recession than U.S. firms, Canadian papermakers reduced capital outlays 43.0% last year and 16.1% in 1982, and an increase this year would end three straight years of decline in capital outlays.

North American paper industry capital spending estimates for 1984 (billions of $).

United States	**1984e**	**1983**	**1982**	**% change 1984/83**
Commerce Dept.[1]				
Paper and allied	$ 7.17	$ 6.18	$ 5.97	16.0
All manufacturing	128.76	111.53	119.68	15.4
McGraw-Hill[2]				
Paper and pulp	6.67	6.18	5.97	7.9
All manufacturing	141.79	111.53	119.68	27.1
Canada				
Statistics Canada[3]				
Paper and allied	C$1.09	C$1.06	C$1.86	2.8
All manufacturing[4]	8.58	8.80	11.49	−2.5

1. Survey conducted April/May.
2. Survey conducted March/April.
3. Survey conducted December/February.
4. Excludes repair expenditures.

U.S. paper industry environmental spending plans for 1984 (millions of $).

	1984e	**1983**	**1982**	**% change 1984/83**
Air	$220	$160	$150	37.5%
Water	100	70	90	42.9
Solid waste	70	20	60	250.0
Total	390	250	300	56.0
% of total capital expenditures	5.5%	4.0%	5.0%	

Source: Commerce Dept.

Quebec will benefit the most from the planned increases, with capital expenditures up 22.7% to $522.0 million. Outlays in Ontario are expected to reach $274.9 million, up 7.8%, while spending in British Columbia—where spending dropped from $366.1 million in 1982 to $100.7 million last year—is seen rising to $126.8 million, up 7.4%.

Planned expenditures for machinery and equipment account for 90.% of the total, the survey shows, with construction accounting for the remaining 10%. New machinery and equipment purchases will rise 5.2% this year to $979.5 million, the study reports.

Environmental spending may climb

U.S. paper industry spending for pollution abatement is expected to rise sharply in 1984, reversing a steady decline in environmental outlays as a percentage of total capital expenditures, reports the latest Commerce Dept. survey of environmental spending.

The Commerce Dept. report, based on surveys conducted in January and February, estimates 1984 paper industry outlays for pollution control of $390 million, up 56% from the $250 million spent last year. As a percentage of total capital expenditures, pollution abatement outlays are expected to rise to 5.5% in 1984, up from 4.0% last year and 5.0% in 1982, the Commerce Dept. reports. If carried out, this would reverse the steady decline in environmental outlays from the peak reached in the mid-1970s.

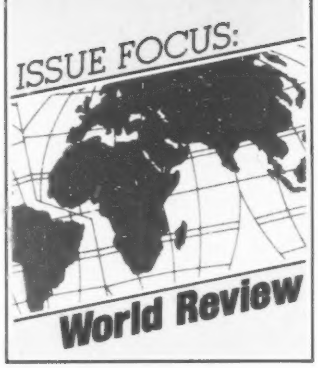
U.S. business as a whole plans to increase spending for pollution abatement in 1984 to $7.6 billion, up 5.5% from the $7.2 billion spent last year, the Commerce report indicates. This would mark the first increase since 1980.

As in the past, air pollution controls are expected to consume the largest share of papermakers' environmental funds, but spending in the water and solid waste categories are continuing to gain in importance.

Conflicting results. In sharp contrast to the Commerce Dept. study, a recent survey of environmental spending plans conducted by McGraw-Hill found that the pulp and paper industry planned to spend $324 million on pollution control in 1984, down 22.2% from $416 million spent in 1983. This translates into a decline in environmental outlays as a percentage of total capital spending to 4.9% in 1984, compared with 6.7% in 1983. The major discrepancy between the Commerce Dept. and McGraw-Hill is in total 1983 environmental spending, where Commerce reported $250 million and McGraw-Hill, $416 million.

Outlays for water pollution control are seen dropping 32% in 1984 to $110 million, down from $162 million in 1983, according to the McGraw-Hill report.

Air pollution and solid waste are both expected to drop 16%, with air pollution spending of $128 million in 1984 down from $153 million last year and the solid waste category down to $85 million this year from $101 million in 1983.



WORLD PULP AND PAPER INDUSTRY: strong recovery sets new records

Pulp and paper demand in 1983-84 boomed as the U.S. industry led the recovery; only a newsprint glut and the strong dollar cloud forecasts

By PETER SUTTON, DAVID O'DONOGHUE, and JOHN KALISH, International Editors

■ The world's pulp and paper industry saw the first signs of a much-needed recovery in 1983. The pickup in demand began in the U.S. in mid-year and had spread to most other countries by end-1983. Several, including the U.S., Japan, Sweden and Fed. Rep. Germany, set new annual records for paper and board output. Recovery continued into the first half of 1984 with pulp and paper price rises succeeding in most major markets.

After falling 1.9% in 1982, world paper and board production rose 6.4% in 1983 to reach an all-time record of 177 million tons. Pulp output was up 6.7% at 131 million tons (after a 1982 drop of 4.4%). Consumption of paper and board rose 6.1% to 177 million tons with average per capita consumption at 85.5 lb (38.8 kg).

The estimated number of paper mills in the world rose by 39 to 6,010, as reported to *Pulp & Paper International*, but the world's papermaking capacity dropped by 0.2%, or 456,000 tons, to 198 million tons. Pulp production capacity declined even more, by 2.6%, or just over 4 million tons, to 148 million tons, and the total number of pulp mills fell 15 to 1,411.

All the main regions of the world had higher output of pulp and paper, with the exception of Australasia, where Australian production fell below the previous year, partly because of a severe drought. Another bad drought affected the South African industry, where total paper and board production also declined.

U.S. LEADS THE WAY. The world's biggest producer and consumer of pulp and paper led the way back to profitability, and the strong U.S dollar continued to be a dominating factor on international markets. The U.S. turnaround began in mid-1983 with a surge in orders mostly for printing/writing grades. Producers of most grades were easily able to push through price increases as the year progressed.

The economic recovery that drove the improvement in the pulp and paper business was also sufficiently strong to enhance the fortunes of most major international paper companies. The Swedish industry in particular really enjoyed a boom year, helped in the export markets by its currency devaluation at end-1982 and the strong U.S. dollar.

Total Norscan market pulp shipments reached a record level of just over 16 million tons in 1983, nearly 19% above the previous, weak year. The average 1983 operating rate was 10 points above 1982 at 87.6%. The pulp market gradually improved through 1983 with some successful price increases. It was not, however, a steady improvement, and some suppliers had trouble holding sales to list prices. Despite the record Norscan shipments, the market still looked uncertain in early 1984,

Production by continents, world total (000 metric tons)

PULP	1960	1970	1980	1982	1983
North America	32,964	54,912	65,969	61,762	66,882
Europe	20,965	34,853	40,235	36,858	39,271
Asia/Australasia	5,156	14,268	18,239	17,308	17,658
Latin America	821	2,224	5,848	5,162	5,539
Africa	124	900	1,502	1,720	1,772
World total	**60,031**	**107,157**	**131,793**	**122,810**	**131,122**

PAPER AND PAPERBOARD	1960	1970	1980	1982	1983
North America	38,917	58,914	70,225	66,373	72,202
Europe	25,634	45,159	59,023	58,181	60,508
Asia/Australasia	7,861	20,621	31,962	32,334	34,646
Latin America	1,656	3,712	7,737	7,815	8,092
Africa	288	892	1,717	1,826	1,828
World total	**74,355**	**129,298**	**170,664**	**166,529**	**177,276**

In this review, data from all countries, including the U.S., are reported in metric tons. All data conform with FAO definitions: thus, paper/board totals do not include insulation board; pulp figures exclude screenings, defibrated, and exploded pulps.

REVIEW OF TOP 26 NATIONS IN PULP/PAPER PRODUCTION

Abridged data on production and export/import trade are given for countries included in the Top 20 tables for paper and board production and for pulp production

Australia

Population: 15,370,800. Per capita consumption of paper and board; 127 kg/281 lb. Paper and board mills: 16. Pulp mills: 18 (sulfate: 2; sulfite: 1; soda: 2; semichemical: 4; mechanical: 8; nonwood: 1)

Paper/board capacity: 1,750,000e tons **Pulp capacity:** 1,155,000e tons

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Newsprint and other printing paper	548	569	432	346	14	—
Other paper and board	948	882	196	228	61	—
Total	**1,496**	**1,451**	**628**	**574**	**75**	**—**
Chemical woodpulp	479	—	241	212	—	6
Other pulps	226	—	1	4	—	—
Total	**705**	**618**	**242**	**216**	**—**	**6**

Austria

Population: 7,551,000. Per capita consumption of paper and board; 109 kg/241 lb. Paper and board mills: 35. Pulp mills: 18 (sulfate: 2; sulfite: 8; semichemical: 1; mechanical: 7)

Paper/board capacity: 2,062,000 tons **Pulp capacity:** 1,222,000 tons
Operating rate 1983: 87% **Operating rate 1983:** 85%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	961	1,014	127	158	628	720
Board/wrapping paper	746	775	84	91	471	487
Total	**1,707**	**1,789**	**211**	**249**	**1,099**	**1,207**
Chemical woodpulp	853	850	183	220	221	224
Other pulps	336	319	18	17	12	12
Total	**1,189**	**1,169**	**201**	**237**	**233**	**236**

Brazil

Population: 126,500,000. Per capita consumption of paper and board; 26 kg/57 lb. Paper and board mills: 160. Pulp mills: 48.

Paper/board capacity: n.a. **Pulp capacity:** n.a.

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	2,013	2,055	249	252	197	262
Board	1,301	1,365	—	—	54	139
Total	**3,314**	**3,420**	**249**	**252**	**251**	**401**
Chemical woodpulp	2,898	2,917	12	8	775	1,011
Other pulps	—	—	1	5	—	—
Total	**2,898**	**2,917**	**13**	**13**	**775**	**1,011**

Canada

Population: 24,900,000. Per capita consumption of paper and board; 188 kg/414 lb. Paper and board mills: 107. Pulp mills: 34.

Paper/board capacity: 15,397,000 tons **Pulp capacity:** 23,418,000 tons
Operating rate 1983: 85% **Operating rate 1983:** 84%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	10,425	11,069	220	291	8,101	8,602
Board	1,983	2,284	149	167	384	518
Total	**12,408**	**13,353**	**369**	**458**	**8,485**	**9,120**
Chemical woodpulp	9,956	11,212	87	97	5,372	6,352
Other pulps	7,051	8,009	59	56	450	443
Total	**17,007**	**19,221**	**146**	**153**	**5,822**	**6,795**

China, People's Rep. of

Population: 1,024,950,000. Per capita consumption of paper and board: 6.8 kg/15 lb. Paper and board mills: 1,600e.

Paper/board capacity: 7,280,000 tons **Pulp capacity:** 6,190,000 tons

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	3,233	3,570	149	n.a.	106	n.a.
Packaging paper/board	2,657	3,043	381	n.a.	92	n.a.
Total	**5,890**	**6,613**	**530**	**518**	**198**	**n.a.**
Chemical woodpulp	760	775	396	n.a.	—	n.a.
Mechanical pulp	335	342	—	n.a.	—	n.a.
Reed, bamboo, other pulps	3,344	3,608	82	n.a.	—	n.a.
Total	**4,439**	**4,725**	**478**	**731**	**—**	**n.a.**

Czechoslovakia

Population: 15,000,000. Per capita consumption of paper and board; 76 kg/168 lb. Paper and board mills: 49. Pulp mills: 24 (sulfate: 5; sulfite: 7; semichemical: 1; mechanical: 10; nonwood: 1)

Paper/board capacity: 1,311,000 tons **Pulp capacity:** 1,031,000 tons
Operating rate 1983: 96% **Operating rate 1983:** 95%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	709	722	41	41	92	88
Board	538	536	84	67	100	86
Total	**1,247**	**1,258**	**125**	**108**	**192**	**174**
Chemical woodpulp	727	771	56	61	60	86
Other pulps	232	206	29	41	3	3
Total	**959**	**977**	**85**	**102**	**63**	**89**

Finland

Population: 4,857,000. Per capita consumption of paper and board; 168 kg/370 lb. Paper and board mills: 46. Pulp mills: 51 (sulfate: 18; sulfite: 8; semichemical: 3; mechanical: 22)

Paper/board capacity: 7,550,000 tons **Pulp capacity:** 8,872,000 tons

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	4,444	4,825	14	14	3,664	4,042
Board	1,451	1,563	28	37	1,168	1,215
Total	**5,895**	**6,388**	**42**	**51**	**4,832**	**5,257**
Chemical woodpulp	4,103	4,379	10	13	1,278	1,404
Other pulps	2,611	2,784	45	19	179	168
Total	**6,714**	**7,163**	**55**	**32**	**1,457**	**1,572**

France

Population: 54,000,000. Per capita consumption of paper and board; 121 kg/267 lb. Paper and board mills: 165. Pulp mills: 26 (sulfate: 7; sulfite: 4; semichemical: 6; mechanical: 9)

Paper/board capacity: 5,500,000 tons **Pulp capacity:** 2,250,000 tons

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	3,077	3,104	1,425	1,483	821	832
Board	2,050	2,157	887	958	300	360
Total	**5,127**	**5,261**	**2,312**	**2,441**	**1,121**	**1,192**
Chemical woodpulp	1,342	1,455	1,461	1,502	167	213
Other pulps	423	407	58	65	2	4
Total	**1,765**	**1,862**	**1,519**	**1,567**	**169**	**217**

but got a boost from the two-and-a-half-month shutdown of Canada's British Columbia market pulp mills.

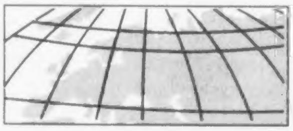
Still too much newsprint. World newsprint production in 1983 recovered from a 3% drop in 1982, to reach 25.9 million tons, 3% over 1982. But newsprint remained the weak sector of the paper industry, mainly because of continuing oversupply. And new newsprint production capacity is due to come online over the next few years, particularly in Europe.

Printing/writing papers on the other hand, enjoyed considerable demand growth in 1983, which continued into 1984. Many magazine grades, including lightweight coated, were on allocation up to at least mid-1984 in both the U.S. and western Europe. 1983 output of printing/writing grades was 43.7 million tons, up 7.8%.

In the **packaging paper and board** sector, 59.4 million tons were produced in 1983, a 6.4% increase over 1982, more directly reflecting the general increase in manufacturing output by most of the bigger countries in 1983. **Kraft linerboard** prices remained depressed in 1983, causing the European Economic Community to enforce minimum price levels to avoid dumping. Dumping was also reported in Asian markets. The high dollar rate coupled with weak local currencies meant that European producers got the better of U.S. linerboard mills by following the downward price trend.

The economic pickup raised demand, however, and from mid-1983 to mid-1984, linerboard prices rose 22% in dollar terms, nearly 40% when expressed in major European currencies. Brazil and South Africa are set to become important linerboard exporters to world markets with extra capacity coming onstream in 1984-85.

'84 OUTLOOK FAIR. The pulp and paper business improved even more during first-quarter 1984, with two successful market pulp price hikes going through both in the U.S. and Europe, while paper prices also climbed in most of the big producing nations. Closure of western Canadian mills during the quarter helped strengthen both pulp and newsprint markets and secure price increases. By mid-1984, many producers were confident new output levels could be reached by year-end. But others were seeing the first signs of a slowdown in demand and wondering if the recovery would last the year.



EUROPE

THE YEAR 1983 was one of recovery for the European paper industry with production, consumption and profits all improving over 1982 levels and drawing closer to the 1981 position. It was obvious from the third quarter that the economic pickup in the U.S. was making its effects felt on the other side of the Atlantic.

While paper and board production in all of Europe (East and West) rose 3.9% in 1983, pulp output rose 6.5%. By far the greatest production increases took place in **Scandinavia** where the joint Finnish, Norwegian and Swedish output total of paper and board reached 14.1 million tons, up 7.5%. Scandinavian pulp output rose by an impressive 9.5% to 17.4 million tons.

Reflecting their improved output performance coupled with the international market upswing, forest product companies in **Sweden** reported total 1983 earnings of $630 million on sales of $6.685 billion. The Swedish Pulp & Paper Assn. forecast that the total value of forest industry exports in the mid-1984 to mid-1985 period will reach $6.433 billion.

Paper and board output in the nine EEC producing states (Luxembourg does not make any paper) rose moderately, up 1.9%, to 24.1 million tons, while pulp output rose 3.6% to 5.5 million tons. In the East European bloc, paper and board production was up 4.3% at 16.1 million tons, and pulp output rose 4.8% to 12.3 million tons.

Fed. Rep. Germany remained Western Europe's biggest paper/board producer with a record 1983 output of 8.27 million tons (7.78 million in 1982). **Finland** came second, with 6.38 million tons (vs 5.89 million in 1982),

World's top 20 producing and consuming countries

PAPER AND BOARD PRODUCTION (000 metric tons)

	1983	% change 1983/82
1. U.S.	58,849	9.1
2. Japan	18,442	5.7
3. Canada	13,353	7.6
4. U.S.S.R.	9,556	6.4
5. Fed. Rep. Germany	8,272	6.3
6. People's Rep. China	6,613	12.3
7. Finland	6,388	8.4
8. Sweden	6,350	7.3
9. France	5,261	2.6
10. Italy	4,259	-6.9
11. Brazil	3,420	3.2
12. U.K.	3,209	0.3
13. Spain	2,754	2.6
14. Mexico	2,062	3.8
15. Korea, Rep.	1,982	14.1
16. Austria	1,789	4.8
17. Netherlands	1,737	6.4
18. Taiwan	1,720	10.5
19. Australia	1,451	-3.0
20. Norway	1,368	4.9

PULP PRODUCTION (000 metric tons)

	1983	% change 1983/82
1. U.S.	47,661	6.5
2. Canada	19,221	13.0
3. Japan	8,860	2.7
4. Sweden	8,668	12.5
5. U.S.S.R.	7,913	6.3
6. Finland	7,163	6.7
7. People's Rep. China	4,725	6.4
8. Brazil	2,917	0.7
9. Fed. Rep. Germany	2,081	3.8
10. France	1,862	5.5
11. Norway	1,640	7.8
12. Spain	1,412	3.8
13. Austria	1,169	-1.7
14. South Africa	1,165	—
15. New Zealand	1,073	3.2
16. Portugal	1,042	9.5
17. Czechoslovakia	977	1.8
18. Poland	871	7.1
19. India	850	—
20. Romania	845	3.7

PER CAPITA CONSUMPTION (lb/year)

	1983	% change 1983/82
1. U.S.	589	6.8
2. Sweden	467	5.0
3. Canada	414	7.4
4. Denmark	373	1.8
5. Finland	370	5.0
6. Switzerland	362	5.1
7. Fed. Rep. Germany	353	5.3
8. Netherlands	348	3.9
9. Japan	337	4.8
10. Belgium	335	6.3
11. New Zealand	324	2.8
12. Norway	287	—
13. Australia	280	-5.9
14. U.K.	278	5.9
15. France	267	3.4
16. Hong Kong	262	-0.8
17. Austria	240	4.8
18. Iceland	225	13.3
19. Singapore	212	43.3
20. Taiwan	203	5.7

and **Sweden** third with 6.35 million (5.91 million in '82).

Major expansions in 1983 were: a 200,000-tpy sulfite market pulp mill in **Czechoslovakia**; a 160,000-tpy newsprint machine plus a 1,330-tpd pressurized groundwood line at Tampella's Anjala mill, **Finland**; a 160,000-tpy fine paper machine at Kymi Kymmene in **Finland** and a similar paper machine at the Svetogorsk combine in Karelia, **U.S.S.R.**; a corrugating medium machine at Kombinat Belišće, **Yugoslavia**, and a 150,000-tpy newsprint machine at Gebruder Lang, **Fed. Rep. Germany**.

More capacity increases. The 1984-85 period will see much more capacity coming onstream. The cost of 1984 pulp and paper mill expansion investments in Europe alone is put at $1.340 billion.

Among the biggest expansions planned in Europe for 1984 are: a 170,000-tpy linerboard and liquid packaging board machine at Nettingsdorf Papier, and a 150,000-tpy newsprint machine at Steyrermühl, both in **Austria**; the 300,000-tpy market pulp mill of Soporcel in **Portugal**; a 60,000-tpy printing/writing grades machine at Szolnok in **Hungary**; and a 75,000-tpy printing/writing paper machine at Kwidzyn in **Poland**.

In mid-1984, some big capacity expansions in **Sweden** were announced. They include: a new 180,000-tpy newsprint machine at Holmens Bruk's Braviken mill for September 1985 startup; a 210,000-tpy newsprint machine at SCA's Ortviken mill for February 1986 startup; a 125,000-tpy uncoated free-sheet machine at MoDo's Husum mill for October 1985 startup; and a 225,000-tpy liquid packaging board machine at Billerud's Gruvön mill for December 1986 startup.

With many of Europe's capacity expansions coming from outside the ten EEC nations, the EEC paper industry reacted nervously to what it saw as a possible tidal

TOP 26 PRODUCING NATIONS *(Continued)*

Fed. Rep. of Germany

Population: 61,421,000. Per capita consumption of paper and board: 160 kg/353 lb. Paper and board mills: 206. Pulp mills: 37 (sulfite: 10; semichemical: 1; mechanical: 26)

Paper/board capacity: 9,091,000 tons
Operating rate 1983: 91%

Pulp capacity: 2,125,000 tons
Operating rate 1983: 98%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	5,126	5,479	2,534	2,718	1,401	1,604
Board	2,657	2,793	1,138	1,221	681	784
Total	**7,783**	**8,272**	**3,672**	**3,939**	**2,082**	**2,388**
Chemical woodpulp	792	800	2,345	2,703	96	114
Other pulps	1,212	1,281	64	73	6	—
Total	**2,004**	**2,081**	**2,409**	**2,776**	**102**	**114**

Italy

Population: 56,800,000. Per capita consumption of paper and board; 86 kg/190 lb. Paper and board mills: 430. Pulp mills: 30 (sulfite: 2; semichemical: 5; mechanical: 16; nonwood: 7)

Paper/board capacity: 5,350,000 tons
Operating rate 1983: 80%

Pulp capacity: 1,050,000 tons
Operating rate 1983: 75%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	2,574	2,468	672	834	619	620
Board	1,999	1,791	429	539	170	158
Total	**4,573**	**4,259**	**1,101**	**1,373**	**789**	**778**
Chemical woodpulp	188	213	1,268	1,276	19	40
Other pulps	628	574	90	103	—	1
Total	**816**	**787**	**1,358**	**1,379**	**19**	**41**

Japan

Population: 119,483,000. Per capita consumption of paper and board: 153 kg/338 lb. Paper and board mills: 593. Pulp mills: 65 (sulfate: 37; sulfite: 3; semichemical: 11; mechanical: 18; nonwood: 3)

Paper/board capacity: 23,198,000 tons
Operating rate 1983: 80%

Pulp capacity: 12,459,000 tons
Operating rate 1983: 71%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	10,351	10,932	351	402	411	365
Board	7,099	7,510	278	280	329	373
Total	**17,450**	**18,442**	**632**	**682**	**740**	**738**
Chemical woodpulp	6,508	6,738	1,274	1,516	66	43
Other pulps	2,118	4,239	479	657	2	2
Total	**8,626**	**8,859**	**1,753**	**2,173**	**68**	**45**

Korea, Rep. of

Population: 39,331,000. Per capita consumption of paper and board; 49 kg/108 lb. Paper and board mills: 170e. Pulp mills: 5 (sulfate: 1; mechanical: 4)

Paper/board capacity: 2,180,000e tons
Operating rate 1983: 89%

Pulp capacity: 314,000 tons
Operating rate 1983: 79%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	893	1,035	25	36	70	52
Board	844	947	12	16	45	46
Total	**1,737**	**1,982**	**37**	**52**	**115**	**98**
Chemical woodpulp	108	116	377	453	—	—
Other pulps	127	126	59	59	—	—
Total	**235**	**242**	**436**	**512**	**—**	**—**

Mexico

Population: 77,000,000. Per capita consumption of paper and board: 29 kg/64 lb. Paper and board mills: 66. Pulp mills: 23 (sulfate: 10; sulfite: 1; mechanical: 1, nonwood: 10)

Paper/board capacity: 2,967,000 tons
Operating rate 1983: 69%

Pulp capacity: 1,078,000 tons
Operating rate 1983: 70%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	1,123	1,166	211	87	—	—
Board	864	895	70	59	—	—
Total	**1,987**	**2,061**	**281**	**146**	**—**	**—**
Chemical woodpulp	422	414	110	145	—	—
Other pulps	326	345	18	9	—	—
Total	**748**	**759**	**128**	**154**	**—**	**—**

Netherlands

Population: 14,360,000. Per capita consumption of paper and board; 158 kg/348 lb. Paper and board mills: 35. Pulp mills: 3 (mechanical: 2; nonwood: 1)

Paper/board capacity: 1,878,000 tons
Operating rate 1983: 93%

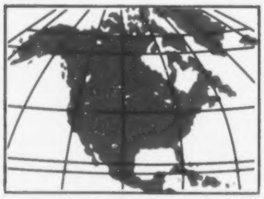
Pulp capacity: 152,000 tons
Operating rate 1983: 99%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	801	860	933	1,010	448	529
Board	832	857	463	504	404	466
Total	**1,633**	**1,737**	**1,396**	**1,514**	**852**	**995**
Chemical woodpulp	—	—	470	521	7	3
Other pulps	136	147	30	28	4	1
Total	**136**	**147**	**500**	**549**	11	**4**

wave of high-quality, duty-free (since Jan. 1, 1984) paper flooding the EEC market from countries in the European Free Trade Assn. (EFTA). The EEC paper industy confederation, Cepac, announced it was watching developments closely and would prepare regular reports on import levels for the EEC. Cepac's main message to the big Scandinavian producers is to concentrate their export efforts on a worldwide basis, not just in the EEC.

EEC/Canada dispute. A dispute between the EEC and Canada over the level of Canadian duty-free newsprint exports in 1984 to the EEC was referred to the General Agreement on Tariffs & Trade regulation body in Geneva for a ruling expected in late-1984. In addition, the EEC investigation into an alleged market pulp cartel continued without solutions in sight. Possible changes in the U.S. dollar-based system for sales of market pulp in the EEC were being examined by lawyers from the EEC Commission and the major market pulp companies.



NORTH AMERICA

THE ECONOMIC RECOVERY, which took hold firmly in the **U.S.** about mid-1983, brought a surge of response for the pulp and paper industry in North America in the second half of the year. It was enough to result in new output records in the U.S. and bring the industry in **Canada** back to good operating levels by the end of the year.

Total North American output of paper and board last year soared by 8.8% to a record 72.2 million tons. The magnitude of the recovery is even better seen in the absolute tonnage increase—almost 6 million tons—which is equivalent to the annual output of Sweden or Finland.

Led by an 11% surge in output of printing and writing grades, the U.S. industry produced 58.85 million tons of paper and board, 4% over the previous high set in 1981. Significantly, production ran at an average annual rate of some 62 million tons during the last four months of the year, compared with only a 57-million-ton rate during the first half. Total pulp output rose 6.5% to 47.7 million tons, while market pulp output jumped 13% to a new record 5.9 million tons.

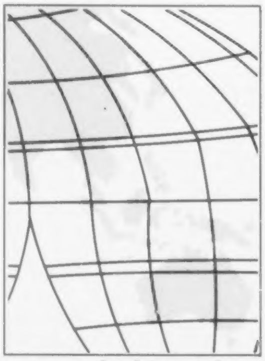
In Canada, the turnaround in market pulp shipments was even more dramatic, up 18% over 1982, but short of the previous record set in 1981. Similarly, although Canada's newsprint mills operated at good rates by year-end, total shipments were up only 5% to 8.45 million tons, far off the 1981 record of 8.9 million tons. Canada's overseas newsprint exports actually dropped 7%, due to sluggish demand in Europe and weak economic conditions in Latin America, according to the Canadian Pulp & Paper Assn. However, Canada's overseas exports are also certainly being affected by increased capacity added in Europe (Fed. Rep. Germany and the U.K.) during the past 18 months, self-sufficiency projects in several Latin American countries, plus the advent of South Africa as a new newsprint exporter.

Canada is currently fighting an EEC attempt to slash the annual non-EFTA nations' duty-free newsprint quota from 1.5 million tons to only 500,000 tons. At mid-1984, the problem had still not been resolved.

The outlook for this year is quite positive, and it appears certain that new record levels will be set in almost every category in the U.S. U.S. paper and board production continued at its record-breaking 62-million-tpy rate during the first quarter of this year, and it appears to have held this through the second quarter. Similar strong rates have been registered for both pulp and wastepaper demand.

Profitability, which also recovered strongly during the fourth quarter of 1983, will certainly benefit from the price increases that have been achieved for most products since the start of this year. The industry's capital expenditures have also continued to climb and are estimated at $7.0 billion for 1984.

In Canada, newsprint shipments are expected to rise another 9% this year to a new record, with mills operating at 93% of capacity. In the market pulp sector, considerable tonnage was lost by the long lockout in British Columbia mills early this year, but the CPPA still expects shipments to rise 7% to a record 7.4 million tons.



ASIA/AUSTRALASIA

IN ASIA, production of both pulp and paper in 1983 were at substantially higher levels than the previous year. The rise in paper and board output was the biggest for at least the last seven years: up nearly 8% at 32.5 million tons. Pulp production went up less, 2.6%, to just under 16 million tons.

In contrast, 1983 paper and board output in Australasia, effectively **Australia** and **New Zealand**, was lower than 1982, making it the only region to see production decline in 1983. It dropped by 3.7% to 2.12 million tons. Output has stayed in the 2.0- to 2.2-million-ton region since 1979. Apparent consumption was down 3.6% at 2.46 million tons, and pulp production fell by 3%, to 1.69 million tons.

Of the big five in Asia, **Japan** reached a new record level for paper and board output of 18.4 million tons, up 5.7% from 1982. Japan remains the major producer in Asia by far: as usual, it produced over 50% of the region's output.

Like the economies of some other nations, the improvement in the Japanese economy was fueled by exports to the U.S. in the first half of 1983, followed by higher domestic demand in the second. Japan raised newsprint and linerboard imports and, following U.S. and EEC pressure, is reducing its import duty on paper products on a shorter time-scale. Domestic industry continues to rationalize with company mergers and agreements to cut overall paper and board capacity. However, there are still several major capital investments going through that will improve not only product quality but also efficiency.

Rep. of Korea and **Taiwan** both had improved market conditions in 1983 and, like Japan, are optimistic about 1984. Rep. of Korea recovered completely with paper output up 14% to just under 2 million tons. Newsprint markets remained the one weak area (as was the case in Japan and some other Asian countries). In Taiwan, 1983 output

WORLD PULP, PAPER, AND BOARD

	Population (000)	Number of mills		CAPACITY (000 m tons)		Per capita (lb)	CONSUMPTION (000 m tons)				PRODUCTION (000 m tons)			
		P&B	Pulp	P&B	Pulp		P&B		Pulp		P&B		Pulp	
							1982	1983	1982	1983	1982	1983	1982	1983
EUROPE														
Belgium	9,900	16	3	1,279	342	335.1	1,411	1,505	588	614	827	837	323	326
Denmark	5,116	6	3	375	135	373.7	850	867	154	178	279	319	111	111
France	54,000	165	26	5,500	2,250	266.1	6,292	6,516	3,115	3,210	5,127	5,261	1,765	1,862
Germany, Fed. Rep	61,421	206	37	9,091	2,125	352.5	9,371	9,822	4,311	4,713	7,783	8,272	2,004	2,081
Greece	9,700	19	4	385	65	104.1	445	458	155	195	280	273	43	45
Ireland	3,200	2	0	50e	0	186.1	270e	270e	20e	20e	20	20	0	0
Italy	56,800	430	30	5,350	1,050	190.0	4,884	4,854	2,155	2,125	4,574	4,259	816	787
Netherlands	14,360	35	3	1,878	152	348.3	2,177	2,256	625	643	1,633	1,737	136	147
United Kingdom	55,950	102	3	3,497	126	278.7	6,750	7,070	1,489	1,654	3,198	3,209	141	173
EEC	**270,447**	**981**	**109**	**27,405**	**6,245**	**274.0**	**32,450**	**33,618**	**12,612**	**13,352**	**23,721**	**24,187**	**5,339**	**5,532**
Finland	4,857	46	51	7,550	8,872	370.3	1,105	1,182	5,312	5,623	5,895	6,388	6,714	7,163
Norway	4,130	23	27	1,785	2,170	286.6	527	533	1,249	1,243	1,304	1,368	1,522	1,640
Sweden	8,330	56	57	7,135	9,443	467.4	1,675	1,858	5,323	5,699	5,918	6,350	7,706	8,668
Scandinavia	**17,317**	**125**	**135**	**16,470**	**20,485**	**397.0**	**3,307**	**3,573**	**11,884**	**12,565**	**13,117**	**14,106**	**15,942**	**17,471**
Austria	7,551	35	18	2,062	1,222	240.3	819	831	1,157	1,170	1,707	1,789	1,189	1,169
Iceland	235	0	0	0	0	225.1	21	24	0	0	0	0	0	0
Malta	350	0	0	0	0	157.4	25e	25e	0	0	0	0	0	0
Portugal	10,088	95	8	720	1,020	106.7	506	488	451	425	583	595	952	1,042
Spain	38,249	197	30	3,113	1,592	160.1	2,807	2,778	1,450	1,383	2,684	2,754	1,360	1,412
Switzerland	6,437	29	5	1,050	325	360.7	1,003	1,053	496	540	889	918	292	284
Other W. Europe	**62,910**	**356**	**61**	**6,945**	**4,159**	**182.1**	**5,181**	**5,199**	**3,554**	**3,518**	**5,863**	**6,056**	**3,793**	**3,907**
Total W. Europe	**350,674**	**1,462**	**305**	**50,820**	**30,889**	**263.7**	**40,938**	**42,390**	**28,050**	**29,435**	**42,701**	**44,349**	**25,074**	**26,910**
Albania	2,750	4	4	10e	10e	10.4	13e	13e	8e	8e	8e	8e	8e	8e
Bulgaria	8,949	20	-	520	280	114.9	462	466	334	351	354	359	212	203
Czechoslovakia	15,000	49	24	1,331	1,031	167.5	1,182	1,182	976	984	1,249	1,258	960	977
German Dem. Rep	16,702	21	19	-	-	178.4	1,355	1,352	801	803	1,261	1,244	678	674
Hungary	10,700	10	6	-	-	133.8	643	649	287	311	462	478	105	103
Poland	36,700	52	21	1,373	1,030	74.5	1,267	1,240	973	996	1,173	1,221	813	871
Romania	22,000	20	12	870e	970e	68.6	684e	685e	939e	959e	805e	806e	815e	845e
USSR	273,800	84	57	10,500	9,500	77.2	8,828	9,446e	6,770	7,233e	8,978	9,556e	7,444	7,913e
Yugoslavia	22,896	30	21	1,425	825	110.2	1,160	1,172	951	884	1,190	1,229	749	767
E. Europe	**409,497**	**290**	**164**	**16,029**	**13,646**	**87.3**	**15,594**	**16,205**	**12,039**	**12,529**	**15,480**	**16,159**	**11,784**	**12,361**
Total Europe	**760,171**	**1,752**	**469**	**66,849**	**44,535**	**168.7**	**56,532**	**58,595**	**40,089**	**41,974**	**58,181**	**60,508**	**36,858**	**39,271**
NORTH AMERICA														
Canada	24,900	107	34	15,397	23,418	415.3	4,292	4,691	11,331	12,579	12,408	13,353	17,007	19,221
United States	234,000	581	195*	64,242	50,986	588.6	57,808	63,216	44,993	48,068	53,965	58,849	44,755	47,661
North America	**258,900**	**688**	**229**	**79,639**	**74,404**	**571.9**	**62,100**	**67,907**	**56,324**	**60,647**	**66,373**	**72,202**	**61,762**	**66,882**
ASIA														
Afghanistan	16,000	0	0	0	0	0.2	1e	1e	0	0	0	0	0	0
Bangladesh	91,000	7	8	165	150	2.2	83	95e	97	97e	73	79e	87	87e
Bahrain	400	0	0	0	0	11.0	2e	2e	0	0	0	0	0	0
Bhutan	1,400	0	0	0	0	1.5	1e	1e	0	0	0	0	0	0
Brunei	300	0	0	0	0	14.8	2e	2e	0	0	0	0	0	0
Burma	33,700	4	2	-	-	2.6	40e	40e	17e	17e	10e	10e	17e	17e
China, People's Rep	1,024,950	1,600e	-	7,280	6,190	15.0	6,222	6,931	4,917	5,456	5,890	6,613	4,439	4,725
Cyprus	700	0	0	0	0	119.7	46	38e	0	0	0	0	0	0
Hong Kong	5,200	3	0	30	0	262.8	620	620e	5	5	20	20e	0	0
India	683,000	222	303	2,165	56	4.9	1,520	1,517	900e	900e	1,250	1,337	850e	850e
Indonesia	150,000	34	15	676	-	9.3	629	626	352	167	332	377	153	167
Iran	40,000	17	8	330	260	25.1	550	454e	180	140e	139	104e	100	80e
Iraq	13,000	2	2	144	90	19.8	70	70e	50	50e	30	30e	30	30e
Israel	4,213	8	0	155	0	177.5	330	339	68	72	133	139	0	0
Japan	119,453	593	65	23,198	12,459	337.3	17,345	18,389	10,313	10,986	17,453	18,442	8,627	8,860
Jordan	3,000	1	2	12	-	8.8	11	12	0	0	15	12	-	-
Kampuchea	9,000	0	0	0	0	1.8	7	7e	0	0	0	0	0	0
Korea, People's Rep	20,000	6	2	100	80	9.9	90	90	50	50	80	80	50	50
Korea, Rep. of	39,331	170	5	2,180	314	108.5	1,660	1,935	671	754	1,737	1,982	235	242
Kuwait	1,400	1	0	24	0	141.8	75	90	5	10	5	20	0	0
Laos	3,800	0	0	0	0	0.7	1	1e	0	0	0	0	0	0
Lebanon	3,300	3	0	20e	0	56.9	90	85e	10	10	10	5	0	0
Macao	300	0	0	0	0	80.9	11	11	0	0	0	0	0	0
Malaysia	11,427	13	-	-	-	59.5	318	335e	4	4e	50	60e	-	-
Mongolia	1,750	1	1	10	-	16.3	13	13e	5	5e	5	5e	5	5e
Nepal	14,700	2	1	5e	15e	2.0	13	13e	8	8e	3	3e	8	8e
Oman	1,000	0	0	0	0	11.0	5	5e	0	0	0	0	0	0
Pakistan	87,524	20	18	140	115	4.4	225	259	109	126	119	133	95	110
Philippines	52,000	20	8	515	303	18.1	366	427	162	210	233	292	127	145
Qatar	300	0	0	0	0	22.0	3	3e	0	0	0	0	0	0
Saudi Arabia	9,400	0	0	0	0	25.8	106	110e	0	0	0	0	0	0
Singapore	2,500	2	0	40e	0	211.6	248	240e	3	3e	15	15e	0	0
Sri Lanka	14,800	2	2	38	26	10.8	67	72e	28	28e	22	27e	21	21e
Syria	9,000	3	0	65	0	17.0	69	69	0	0	10	10e	0	0
Taiwan	18,775	157	2	1,960	400	202.8	1,487	1,704	354	416	1,557	1,720	293	300*
Thailand	50,000	33	5	446	110	22.7	491	517	128	130e	351	360e	41	50e
Turkey	48,000	35	16	637	548	26.7	588	581e	371	238e	531	568e	350	180e
United Arab Emirates	1,000	0	0	0	0	13.2	6	6e	0	0	0	0	0	0
Vietnam	53,000	55e	50e	100e	90e	3.7	68e	88e	85e	95e	63e	83e	35e	40e
Yemen Arab Rep.	5,500	0	0	0	0	0.9	2	2e	0	0	0	0	0	0
Yemen Dem. Rep.	2,000	0	0	0	0	2.2	2	2e	0	0	0	0	0	0
Asia	**2,646,123**	**3,014**	**515**	**40,435**	**21,206**	**28.0**	**33,463**	**35,802**	**18,892**	**19,977**	**30,136**	**32,526**	**15,563**	**15,967**

**Market pulp only.*

e = Estimate.

Note: The per capita figure is for consumption of paper and board in 1983. Some national editors have taken other factors into consideration, such as inventory; hence, production plus imports less exports is not always the same amount as noted above.

INDUSTRY AT A GLANCE

	Population (000)	Number of mills		CAPACITY (000 m tons)		Per capita (lb)	CONSUMPTION (000 m tons)				PRODUCTION (000 m tons)			
		P&B	Pulp	P&B	Pulp		P&B 1982	P&B 1983	Pulp 1982	Pulp 1983	P&B 1982	P&B 1983	Pulp 1982	Pulp 1983
AUSTRALASIA														
Australia	15,371	16	18	1,750	1,155	280.0	2,049	2,025	947	828	1,496	1,451	705	618
Fiji	700	0	0	0	0	31.5	10e	10e	0	0	0	0	0	0
New Zealand	3,190	6	6	797	1,312	324.1	488	419	615	611	702	669	1,040	1,073
Papua New Guinea	3,700	0	0	0	0	3.5	6e	6e	0	0	0	0	0	0
Samoa	200	0	0	0	0	11.0	1e	1e	0	0	0	0	0	0
Australasia	**23,161**	**22**	**24**	**2,547**	**2,487**	**232.1**	**2,554**	**2,461**	**1,562**	**1,439**	**2,198**	**2,120**	**1,748**	**1,691**
LATIN AMERICA														
Argentina	29,000	91	18	1,020	670	70.5	918	929	504	637	838	883	390	618
Bahamas	210	0	0	0	0	10.6	1	1e	0	0	0	0	0	0
Barbados	280	0	0	0	0	55.1	7	7e	0	0	0	0	0	0
Belize	150	0	0	0	0	29.3	3	2e	0	0	0	0	0	0
Bolivia	5,600	2	0	-	0	39.0e	99e	99e	48e	48e	59e	59e	26e	26e
Brazil	126,480	160	48	-	-	57.1	3,312	3,271	2,136	1,919	3,314	3,420	2,898	2,917
Chile	11,682	18	7	433	851	50.5	222	267	190	276	262	325	667	796
Colombia	28,000	26	6	530	250	35.5	460	451e	233	235e	366	365e	194	189e
Costa Rica	2,435	2	1	18	25	112.2	124	124	13	16	13	13	7	10
Cuba	10,000	9	3	150	60	51.1	232	232e	80	80e	73	73e	32	32e
Dominican Rep	5,551	2	0	45e	0	25.8	65	65e	4	4e	9	9e	0	0
Ecuador	8,500	9	5	62	32	25.6	99	99	48	48	59	59	26	26
El Salvador	5,500	3	0	40	0	20.9	52	52e	3	5	22	23	0	0
Guatemala	7,500	4	0	50	0	28.0	88	95e	5	10e	43	40e	0	0
Guyana	900	0	0	0	0	17.2	7	7e	0	0	0	0	0	0
Haiti	5,800	0	0	0	0	2.2	6	6e	0	0	0	0	0	0
Honduras	4,000	0	0	0	0	38.6	65	70e	0	0	0	0	0	0
Jamaica	2,226	1	0	18e	0	22.7	22	23	0	0	9	8	0	0
Mexico	77,000	66	23	2,967	1,078	63.3	2,268	2,208	876	913	1,967	2,062	748	759
Neth. Antilles	247	0	0	0	0	26.7	3	3e	0	0	0	0	0	0
Nicaragua	2,000	0	0	0	0	22.0	25	20e	0	0	0	0	0	0
Panama	2,100	3	0	20	0	84.0	80	80	0	0	21	23	0	0
Paraguay	3,117	3	0	0	0	18.3	26	26e	15	15	13	13	15	15
Peru	19,000	15	4	427	311	20.5	197	176	110	81	145	131	75	60
Surinam	355	0	0	0	0	93.3	15	15e	0	0	0	0	0	0
Trinidad/Tobago	1,200	0	0	0	0	56.9	31	31e	0	0	0	0	0	0
Uruguay	2,900	12	5	60	28	37.3	47	49	28	32	43	47	21	28
Venezuela	16,800	12	3	650	160	102.3	779	779	233	233	539	539	63	63
Latin America	**378,533**	**438**	**123**	**6,490**	**3,465**	**53.6**	**9,253**	**9,187**	**4,526**	**4,552**	**7,815**	**8,092**	**5,162**	**5,539**
AFRICA														
Algeria	20,000	6	3	34	24	15.0	133	135	92	91	87	90	31	31
Angola	7,200	2	1	30e	45e	8.6	28e	28e	25e	25e	15e	15e	35e	35e
Benin	3,670	0	0	0	0	1.8	3e	3e	0	0	0	0	0	0
Botswana	850	0	0	0	0	2.6	1e	1e	0	0	0	0	0	0
Burundi	4,590	0	0	0	0	2.0	4e	4e	0	0	0	0	0	0
Cameroon	8,600	0	1	0	120	6.4	25e	25e	0	0	0	0	90e	90e
Central African Rep	2,340	0	0	0	0	0.9	1e	1e	0	0	0	0	0	0
Chad	4,590	0	0	0	0	0.9	2e	2e	0	0	0	0	0	0
Congo	1,580	0	0	0	0	1.3	1e	1e	0	0	0	0	0	0
Egypt	45,000	15	3	170	60	14.3	270	292	75	78	133	136	46	47
Ethiopia	33,000	2	0	8	0	1.1	15e	15e	5	5e	5	5e	0	0
Gabon	610	0	0	0	0	7.3	2e	2e	0	0	0	0	0	0
Gambia	610	0	0	0	0	7.3	2e	2e	0	0	0	0	0	0
Ghana	15,000	0	0	0	0	0.4	3e	3e	0	0	0	0	0	0
Guinea	5,410	0	0	0	0	1.5	4e	4e	0	0	0	0	0	0
Ivory Coast	8,160	0	0	0	0	9.5	35	35e	0	0	0	0	0	0
Kenya	17,000	4	2	80	60	8.4	55	65e	53	55e	60	67e	53	52e
Lesotho	1,380	0	0	0	0	1.5	1e	1e	0	0	0	0	0	0
Liberia	1,910	0	0	0	0	1.1	1e	1e	0	0	0	0	0	0
Libya	3,000	2	0	10	0	15.4	21e	21e	6	6e	6	6e	0	0
Madagascar	9,500	1	2	28	11	3.7	14	16	10	11	12	14	6	7
Malawi	6,120	0	0	0	0	4.4	12e	12e	0	0	0	0	0	0
Mali	7,040	0	0	0	0	0.2	1e	1e	0	0	0	0	0	0
Mauritania	1,680	0	0	0	0	5.3	4e	4e	0	0	0	0	0	0
Mauritius	1,020	0	0	0	0	15.2	7e	7e	0	0	0	0	0	0
Morocco	21,500	8	1	120	100	19.8	174	182	41	55	104	108	69	86
Mozambique	10,500	2	0	10	0	4.6	23e	23e	3	3e	3	3e	0	0
Niger	5,460	0	0	0	0	0.4	1e	1e	0	0	0	0	0	0
Nigeria	85,000	3	3	14	-	4.4	110	252	0	35	0	12	0	24
Rwanda	5,100	0	0	0	0	0.9	2e	2e	0	0	0	0	0	0
Senegal	5,770	0	0	0	0	6.4	17e	17e	0	0	0	0	0	0
Sierra Leone	3,570	0	0	0	0	1.3	2e	2e	0	0	0	0	0	0
Somalia	3,770	0	0	0	0	1.1	2e	2e	0	0	0	0	0	0
South Africa	24,000	16	10	1,460	1,190	118.6	1,325	1,292	989e	985e	1,295	1,255	1,165e	1,165e
Sudan	21,595	4	0	10	0	4.4	13	20e	0	0	3	10	0	0
Swaziland	700	0	1	0	180	3.1	1	1	1	-	0	0	170	175
Tanzania	17,750	1	0	4	0	3.5	28	28e	3	3e	3	3e	0	0
Togo	2,650	0	0	0	0	5.1	6e	6e	0	0	0	0	0	0
Tunisia	6,500	5	1	35	25	27.6	77	81	9	10	29	33	18	20
Uganda	13,500	1	0	5	0	1.3	8	8e	3	3	3e	3e	0	0
Upper Volta	7,040	0	0	0	0	0.2	1e	1e	0	0	0	0	0	0
Zaire	28,350	1	0	3	0	0.7	9e	9e	1e	1e	1	1	0	0
Zambia	6,250	1	2	16	14e	11.2	32e	32e	12	15	12	12e	7e	10e
Zimbabwe	7,500	3	2	75	35e	23.6	80e	80e	55e	55e	55e	55e	30e	30e
Africa	**486,365**	**77**	**32**	**2,112**	**1,864**	**12.3**	**2,556**	**2,720**	**1,383**	**1,431**	**1,826**	**1,828**	**1,720**	**1,772**
WORLD TOTAL	**4,553,253**	**5,991**	**1,392**	**198,072**	**147,941**	**85.5**	**166,478**	**176,672**	**122,776**	**130,010**	**186,529**	**177,276**	**122,810**	**131,122**

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was also up, by 10.5% at 1.72 million tons, despite lost output from the temporary closure of two major companies.

Paper/board output in **India** increased by 7% to 1.34 million tons. Two new newsprint mills started up during the year and more are under construction. India also saw a sharp increase in the number of small mills (from 2 to 30 tpd) using imported second-hand machines. The bigger mills were hit by power failures and shortages of raw materials and spare parts. Similar problems affect the smaller neighboring producers in **Pakistan** and **Bangladesh**.

People's Rep. of China had another major rise in paper and board production in 1983, up 12.3% to 6.61 million tons, while imports dropped 2% to 518,000 tons. A machine modernization program is becoming widespread, as shown by new rebuild agreements with major foreign suppliers and by the 420,000-tpy rise in paper and board production capacity in 1983.

Of new mill projects, **Malaysia** is now going ahead with two big new integrated printing/writing mills, and there are tentative plans for a new mill in **Thailand**. In **Indonesia**, a major kraft paper and board project is now in doubt following the withdrawal of Georgia-Pacific. Government control of paper dumping helped mills in the **Philippines** to increase output, but the difficulty of importing raw materials and poor industry profitability make the 1984 outlook uncertain.

Australasia output falls. Paper and board output in 1983 for both **Australia** and **New Zealand** fell below 1982 levels. While both enjoyed the beginnings of recovery by end-1983, it came too late to boost output, and industry profitability was down in Australia particularly. An 8% drop in Australian output of packaging and industrial grades—one result of a bad drought—was largely responsible for the total fall of 3% to 1.45 million tons.

TOP 26 PRODUCING NATIONS *(Continued)*

New Zealand

Population: 3,190,000. Per capita consumption of paper and board: 147 kg/324 lb. Paper and board mills: 6. Pulp mills: 6 (sulfate: 2; semichemical: 2; mechanical: 5)

Paper/board capacity: 797,091 tons **Pulp capacity:** 1,312,170 tons
Operating rate 1983: 84% **Operating rate 1983:** 82%

(000 metric tons)

	Production		Imports		Exports	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	476	410	47	37	222	228
Board	226	259	—	—	38	59
Total	**702**	**669**	**47**	**37**	**260**	**287**
Chemical woodpulp	557	604	14	7	227	219
Other pulps	483	469	2	1	214	251
Total	**1,040**	**1,073**	**16**	**8**	**441**	**470**

Norway

Population: 4,130,000. Per capita consumption of paper and board; 130 kg/287 lb. Paper and board mills: 23. Pulp mills: 27 (sulfate: 2; sulfite: 4; semichemical: 2; mechanical: 19)

Paper/board capacity: 1,785,000 tons **Pulp capacity:** 2,170,000 tons
Operating rate 1983: 77% **Operating rate 1983:** 75%

(000 metric tons)

	Production		Imports		Exports	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	1,170	1,234	110	120	898	961
Board	134	134	97	96	90	96
Total	**1,304**	**1,358**	**207**	**216**	**988**	**1,057**
Chemical woodpulp	642	715	219	131	333	378
Other pulps	992	1,060	6	11	271	295
Total	**1,522**	**1,640**	**222**	**138**	**495**	**535**

Poland

Population: 36,700,000. Per capita consumption of paper and board: 34 kg/75 lb. Paper and board mills: 52. Pulp mills: 21 (sulfate: 6; sulfite: 2; semichemical: 2; mechanical: 8; nonwood: 3)

Paper/board capacity: 1,373,000 tons **Pulp capacity:** 1,030,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	765	813	70	73	16	29
Board	408	408	56	27	16	52
Total	**1,173**	**1,221**	**126**	**100**	**32**	**81**
Chemical woodpulp	618	678	130	112	4	32
Other pulps	195	193	34	45	—	—
Total	**813**	**871**	**164**	**157**	**4**	**32**

Portugal

Population: 10,088,200. Per capita consumption of paper and board: 48 kg/106 lb. Paper and board mills: 95. Pulp mills: 8 (sulfate: 5; sulfite: 2; soda: 1)

Paper/board capacity: 720,000 tons **Pulp capacity:** 1,020,000 tons
Operating rate 1983: 83% **Operating rate 1983:** 102%

(000 metric tons)

	Production		Imports		Exports	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	370	408	47	50	21	41
Board	218	187	34	23	137	139
Total	**558**	**595**	**81**	**73**	**158**	**180**
Chemical woodpulp	909	1,010	13	18	521	641
Other pulps	43	32	7	6	—	—
Total	**952**	**1,042**	**20**	**24**	**521**	**641**

Romania

Population: 22,000,000. Per capita consumption of paper and board: 31 kg/68 lb. Paper and board mills: 20. Pulp mills: 12 (sulfate: 7; sulfite: 3; semichemical: 1; mechanical: 1; nonwood: 4)

Paper/board capacity: 870,000e tons **Pulp capacity:** 970,000e tons

(000 metric tons)

	Production		Imports		Exports	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	255	256	n.a.	n.a.	n.a.	n.a.
Board	550	550	n.a.	n.a.	n.a.	n.a.
Total	**805**	**806**	**46**	**46**	**167**	**167**
Chemical woodpulp	645	675	n.a.	n.a.	n.a.	n.a.
Other pulps	170	170	n.a.	n.a.	n.a.	n.a.
Total	**815**	**845**	**134**	**134**	**10**	**20**

South Africa

Population: 24,000,000. Per capita consumption of paper and board: 54 kg/119 lb. Paper and board mills: 16. Pulp mills: 10 (sulfate: 2; sulfite: 1; soda: 1; semichemical: 2; mechanical: 2; nonwood: 2)

Paper/board capacity: 1,460,000 tons **Pulp capacity:** 1,190,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	747	690	158	169	171	147
Board	548	565	79	71	36	54
Total	**1,295**	**1,255**	**237**	**240**	**207**	**201**
Chemical woodpulp	460	460	216	220	30	40
Other pulps	705	705	1	—	363	360
Total	**1,165**	**1,165**	**217**	**220**	**393**	**400**

The pulp and paper industry in New Zealand, where nearly 50% of output is exported, was hit by weak international markets in early 1983. Pulp output ended the year marginally up at 1.07 million tons, while paper and board production was down 4.7% at 669,000 tons. But there was a marked improvement in early 1984 and some companies expected record profits.

LATIN AMERICA

THE ECONOMIC UPSWING in North America and Europe, beginning in the second half of 1983, brought some relief to the pulp and paper industry in Latin America. One major problem that did not go away, however, was the continent's massive foreign debt, estimated to be $160 billion. The 1984 interest payments on existing loans alone was estimated at $22.5 billion.

With inflation in double, and sometimes treble, figures (Argentina's inflation rate was 500% in 1983-84), the trend in Latin America's pulp and paper industry was toward greater self-sufficiency, especially in pulp and newsprint, to ease the crippling import bill for these commodities.

Latin American countries tried to join together to solve their common debt problems, and the major nations' finance ministers frequently met. One example of cooperation was when **Brazil, Colombia, Venezuela** and **Mexico** helped **Argentina** to pay $300 million of a $500-million overdue interest payment package.

The debt repayment issue was the subject of talks between Latin American debtor nations (most of whose debt is owed to U.S. banks) and the International Monetary Fund (IMF) in Washington. The IMF's insistence on strict domestic austerity programs, as a prerequisite for continuing aid, was unacceptable to many of the debtor nations. The point was made frequently in 1983 that every time the U.S. prime interest rate rose 1%, it added about another $1.5 billion/year to Latin America's debt bill. Several debtor nations demanded that the IMF establish a special aid fund linked to rising interest rates in the U.S.

Output up in 1983. Total Latin American paper and board output rose 3.5% in 1983 to just over 8 million tons. Inline with the continent's overall plan of cutting imports and boosting exports, paper and board imports fell 7.9% to 1.67 million tons, while exports rose a massive 48.8% (mainly from **Brazil** and **Chile**), to just under 600,000 tons. Much of the increase was traded internally among Latin American countries.

Total pulp production in Latin America last year rose 7.7% to 5.538 million tons. Pulp imports fell 5.4% to 577,000 tons, and exports were up 25.5% to 1.57 million tons. In **Argentina**, the new Alto Paraná mill helped raise pulp exports by 38,000 tons in its first year of production. The mill expects to export 40%, or almost 70,000 tpy, of its output at full capacity in 1984-85.

Pulp exports from **Chile** rose 9% to 520,000 tons, while **Brazil**'s exports were up 30% at 1.011 million tons, breaking the million-ton barrier for the first time. Of **Brazil**'s market pulp, 19% went to Japan in 1983, followed by 17% to the U.S. and 13% to Fed. Rep Germany, its third largest market.

Last year saw the completion of a number of pulp and paper projects. Papel del Tucuman started up its 105,000-tpy bagasse-based newsprint mill at San Miguel, **Argentina**. In **Mexico**, San Cristóbal started up a new 50,000-tpy tissue machine at its Ecatepec mill.

Several major projects are scheduled for startup in Latin America in 1984. They include: Celulosa Argentina's 140,000-tpy kraft paper and corrugating medium mill and an adjacent 170,000-tpy unbleached kraft pulp mill in **Argentina**; Pisa's 110,000-tpy newsprint machine in Brazil, as well as a 100,000-tpy TMP pulp line; Suzano's 140,000-tpy folding boxboard machine in **Brazil**; Papeles Sudamericana's integrated 100,000-tpy packaging paper mill in Chile; Papelcol's 80,000-tpy integrated printing and writing paper mill in **Colombia**; and the El Rancho pulp mill in **Guatemala**, scheduled to make 100,000 tpy of bleached and semibleached kraft pulp beginning at the end of 1984.

Although some large-scale pulp and paper projects were announced in various countries for late-1980s startup, the continuing debt crises were almost certain to cause postponements, according to observers.

AFRICA

FOR THE THIRD YEAR in a row, African paper and board production stayed at virtually the same level. It totaled 1.83 million tons in 1983, just 2,000 tons higher than 1982 and marginally below the 1981 total of 1.84 million tons.

The trend in African production shows steady growth through the late 1970s from 1.42 million tons in 1977, followed by almost zero growth in the early 1980s. But another growth period, probably the biggest in the continent's history, is about to begin as the major pulp and paper expansions in South Africa start running.

Paper and board output in **South Africa**, totaling over twice as much as the rest of African production put together, usually determines whether the continent has a good or bad year. However, in 1983 it was the output of the other nations that produced the continent's total increase (though small) over 1982, because South African production alone dropped 3% to 1.26 million tons.

A 35% drop in newsprint production was the main reason for the decline. However, paper stocks at South African mills also dropped over the year, by about 22% to 100,000 tons, and newsprint stocks dropped most of all, by about 50,000 tons to 30,000 tons by end-1983. A strong U.S. dollar, low gold price and a very severe drought all affected the South African economy with a consequent effect on paper and board demand. Alleged dumping of paper from the U.S. and weak international pulp and paper prices also took their toll.

Major growth period. But the South African capacity and thus total African capacity is going through its biggest growth period ever. The new pulp, newsprint and, particularly, linerboard production lines from Sappi's

Ngodwana and Mondi's Richards Bay mills should be running by end-1985. The increase in output should become fully effective in 1987, provided of course that ready buyers (mainly in Europe and the Far East) for the increased export tonnage can be found.

Other expansion projects in Africa are also progressing, though realistic startup dates are difficult to determine. However, several are now nearing completion.

In **Nigeria**, there is at last some hope that money may be provided by the new government to start up two of the three new mills. These have been built, and one even held a short trial run on one machine in 1983, but they lack funds for power and raw materials for startup.

In **Egypt**, two extensive mill modernizations are now under way, and tenders are being sought for a greenfield integrated bagasse/printing and writing grade mill. The Southern Paper Mills' project at Mufindi in **Tanzania** to make printing/writing grades and kraft paper and board received further finance for personnel training and should be nearing startup.

The government of **Sudan** is looking at possible sites for a bagasse-printing/writing grades mill, and the nation's fourth paper company began operating in early 1984. In **Kenya**, the country's first mechanical pulp mill is starting up in mid-1984, and a small new newsprint mill is being planned. In **Morocco**, three new investments are due for completion over 1984-85, including a pulp line rebuild at Cellulose du Maroc, adding 20,000 tpy capacity.

Prospects for Africa's pulp/paper industry are brighter than they seemed in 1982 and early 1983. There is guarded optimism about recovery in 1984, and capacity should significantly grow over the next few years, reducing the heavy dependence on imports. ■

TOP 26 PRODUCING NATIONS *(Continued)*

Spain

Population: 38,249,000. Per capita consumption of paper and board: 73 kg/161 lb. Paper and board mills: 197. Pulp mills: 30 (sulfate: 13; sulfite: 1; semichemical: 1; mechanical: 10; nonwood: 5)

Paper/board capacity: 3,113,000* tons **Pulp capacity:** 1,592,000 tons
Operating rate 1983: 85% **Operating rate 1983:** 86%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	1,429	1,494	342	295	197	200
Board	1,254	1,260	119	117	140	188
Total	**2,683**	**2,754**	**461**	**412**	**337**	**388**
Chemical woodpulp	1,010	1,057	259	257	151	264
Other pulps (includes semichemical)	350	355	1	4	18	26
Total	**1,360**	**1,412**	**260**	**261**	**169**	**290**

* Calculated on working 330 days/year.

Sweden

Population: 8,330,000. Per capita consumption of paper and board: 212 kg/467 lb. Paper and board mills: 56. Pulp mills: 57 (sulfate: 25, sulfite: 9; semichemical: 2; mechanical: 21)

Paper/board capacity: 7,135,000 tons **Pulp capacity:** 9,443,000 tons
Operating rate 1983: 89% **Operating rate 1983:** 92%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	3,561	3,793	119	147	2,545	2,728
Board	2,357	2,557	65	67	1,882	1,978
Total	**5,918**	**6,350**	**184**	**214**	**4,427**	**4,706**
Chemical woodpulp	5,867	6,628	74	85	2,107	2,644
Other pulps	1,839	2,040	18	25	368	435
Total	**7,706**	**8,668**	**92**	**110**	**2,475**	**3,079**

Taiwan

Population: 18,775,000. Per capita consumption of paper and board: 92 kg/204 lb. Paper and board mills: 175. Market pulp mills: 2 (sulfate: 1; nonwood: 1)

Paper/board capacity: 1,960,000 tons **Pulp capacity:** 400,000 tons
Operating rate 1983: 88% **Operating rate 1983:** 75%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	514	537	85	94	41	27
Board	1,042	1,183	13	13	127	96
Total	**1,556**	**1,720**	**98**	**107**	**168**	**123**
Chemical woodpulp	207	216	128	173	59	58
Other pulps	86	84	4	7	13	6
Total	**293**	**300**	**132**	**180**	**72**	**64**

U.S.S.R.

Population: 273,800,000. Per capita consumption of paper and board: 35 kg/77 lb. Paper and board mills: 84. Pulp mills: 57.

Paper/board capacity: 10,500,000 tons **Pulp capacity:** 9,500,000 tons

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	5,439	5,667	690	740	730	731
Board	3,539	3,889	270	270	380	380
Total	**8,978**	**9,556**	**960**	**1,010**	**1,110**	**1,111**
Chemical woodpulp	5,881	6,251	271	271	955	955
Other pulps	1,563	1,662	—	—	—	—
Total	**7,444**	**7,913**	**271**	**271**	**955**	**955**

United Kingdom

Population: 55,950,000. Per capita consumption of paper and board: 126 kg/278 lb. Paper and board mills: 102. Pulp mills: 3 (semichemical: 2; mechanical: 1)

Paper/board capacity: 3,497,000 tons **Pulp capacity:** 196,000 tons
Operating rate 1983: 92% **Operating rate 1983:** 88%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	1,503	1,464	2,590	2,728	162	179
Board/other paper	1,695	1,745	1,361	1,557	237	245
Total	**3,198**	**3,209**	**3,951**	**4,285**	**399**	**424**
Chemical woodpulp	80	—	1,219	1,339	—	1
Other pulps	61	—	131	144	2	—
Total	**141**	**173**	**1,350**	**1,483**	**2**	**1**

United States

Population: 234,000,000. Per capita consumption of paper and board: 267 kg/589 lb. Paper and board mills: 581 (1982). Pulp mills: 195 (sulfate: 120; sulfite: 20; semichemical: 41; mechanical: 47)

Paper/board capacity: 64,242,000* tons **Pulp capacity:** 50,986,000* tons
Operating rate 1983: 92% **Operating rate 1983:** 94%

(000 metric tons)

	Production		**Imports**		**Exports**	
	1982	**1983**	**1982**	**1983**	**1982**	**1983**
Paper	27,599	29,863	7,033	7,787	781	721
Board	26,366	28,986	105	152	2,514	2,851
Total	**53,965**	**58,849**	**7,138**	**7,939**	**3,295**	**3,572**
Chemical woodpulp	40,161	43,064	3,186	3,546	3,075	3,300
Other pulps	5,585	5,741	300	341	579	593
Total	**44,755**	**47,661**	**3,317**	**3,713**	**3,080**	**3,306**

* Capacity data exclude 1,141,000 tons of construction paper capacity and 1,354,000 tons of woodpulp for construction paper and board.

READER SALARY SURVEY

This issue contains a postage-paid survey form that readers can fill out and mail in; survey results will be published in our December 1984 issue

Tell us about your salary and benefits

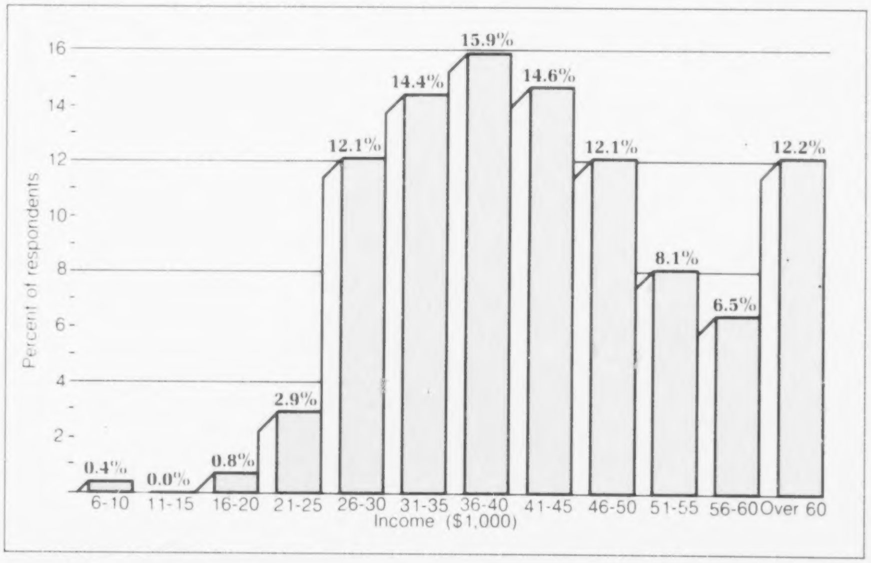
By KENNETH E. SMITH, Executive Editor

■ The December 1983 issue of *Pulp & Paper* reported the results of our first reader salary and opinion survey. The survey is being repeated again this year, and this issue contains a postage-paid (for U.S. residents), tear-out survey form beginning on page 81 that our readers can use to tell us about their salaries and benefits as well as express opinions on any subject. We hope that each of you will take just a few minutes to complete the form and mail it back to us no later than *October 19, 1984*.

Judging by the response to last year's survey, we know that the information gathered by this type of survey is of great interest to our readers. Obviously, the more people who participate in the survey, the more meaningful are the final survey data and conclusions. In addition to questions about compensation, the form contains space for reader comments. We would appreciate your comments on any subject from salary and benefits to suggestions on how we can improve *P&P* itself. We do listen to our readers, and especially interesting comments will be published. All completed survey forms will be turned over to an independent consultant for data processing as received, and the results will be published in our December 1984 issue.

In addition to the tear-out form, we have printed the questionnaire a second time in this issue (page 78) to be used as a permanent record for survey respondents.

FIGURE 1:
Income distribution of 1983 survey respondents.



Also, our "pass-along" readers who may receive the magazine after the survey form has been removed can still photocopy and complete the survey form and mail it in. The survey is strictly confidential, and respondents should not sign it or otherwise identify themselves.

Only 3.6% of last year's respondents were Canadians. Unfortunately, we cannot include a postage-paid envelope for Canadian residents due to postal regulations. However, we want to hear more from north of the border this year and hope that our Canadian readers will let us know how they've fared in 1984.

BENEFITS OF ECONOMIC RECOVERY. 1983 was a year of recovery for the U.S. pulp and paper industry, and the results of our 1983 survey clearly reflected this recovery as well as the residual effects of the deepest recession since the Great Depression. More than 88% of the survey respondents reported that they were happy in their jobs and that their overall job morale was good. More than 83% said they would stay in the industry if they changed jobs. The median salary of all our respondents was $42,000. The last pay increase received by respondents averaged 8%, and additional salary and benefits received averaged between $5,000 and $10,000. These figures compared favorably with salary data published in recent years by the Engineering Manpower Commission for engineers in the paper industry.

However, survey respondents also reported an average of only two salary increases in the past three years while noting that normally their salaries are reviewed on an annual basis. Obviously, this data indicates that salary freezes were in effect for many survey respondents during the last recession. In fact, many respondents commented they had received little or no increase in salary in recent years, although they had taken on additional responsibilities due to staffing cuts, while union employees at the same companies had continued to receive larger increases according to union contract. Other reader concerns included the problems of salary compression and discrimination against older employees and the need for more women in management positions.

As this issue goes to press, 1984 promises to be a record production and profit year for most pulp and paper companies. We hope this year's survey will show that industry professionals have shared in the current success through increased salaries and improved benefits.

SURVEY FOR ALL PROFESSIONALS. The editors of *P&P* recognize that all professionals within the industry are not engineers. Some have "come up through the ranks" or have degrees in fields other than engineering. In fact, more than 25% of the 1983 survey respondents had bachelor's degrees in disciplines other than engineering. An associate's degree or high school diploma was the highest level of education for another 11%. To our knowledge, no one else has surveyed all managers in the industry on salary and benefits. Therefore, our survey contains questions specifically for industry managers. We want to know how the level of supervisory responsibility and experience affects salary and benefits. Other questions the survey is designed to answer are:

- What jobs in the industry pay the most?
- Which degrees and fields of education lead to the highest salaries?
- Does "job hopping" lead to higher salaries in the long term?
- Does the area you live in affect your salary and benefits?
- Do consultants make more money and have better benefits than managers within the industry?
- Has the value of your benefits kept pace with salary levels and inflation?
- Are you happy in the industry, and if you changed jobs would you remain in the industry?

The editors hope that by addressing issues that concern our readers we can continue to make *P&P* the most useful and well read magazine serving the industry. You can help us to help you by taking time now to complete the survey form as thoroughly as possible. *Please remember we need your response by October 19, 1984!* ■

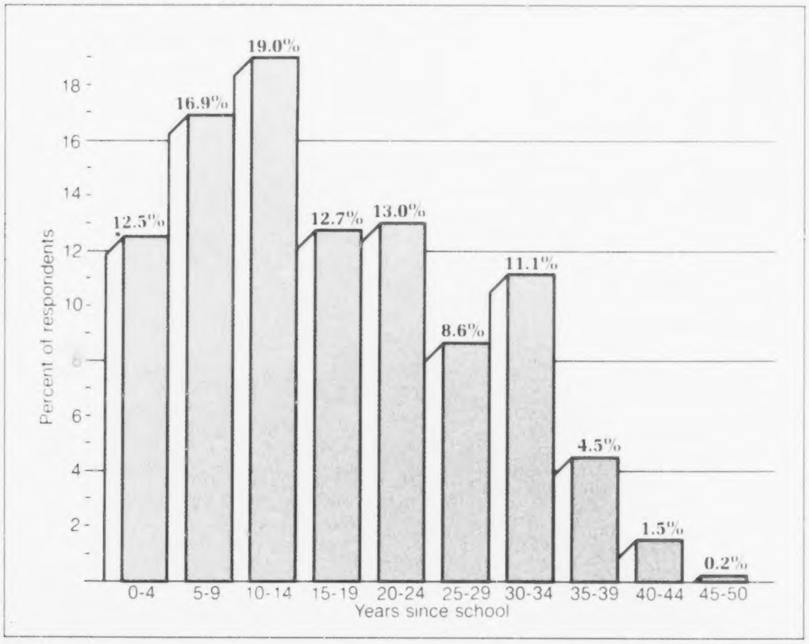
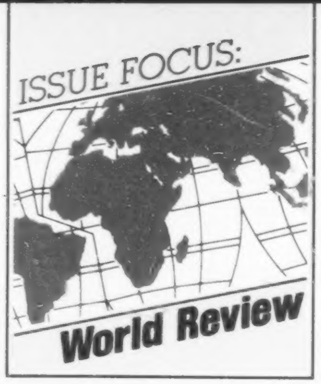


FIGURE 2:
Years of experience distribution of 1983 respondents.



World pulp markets strengthen in U.S., still slow in Europe, Japan

Substantial new market pulp capacity must be absorbed by a healthy world market; potential major capacity expansion seen for eucalyptus

By JOHN C.W. EVANS, Senior Editor

■ World pulp markets, excluding the U.S., experienced only a modest increase in demand during 1983. A major negative factor was the slow rate of economic recovery in western European countries, which consume about one-half of the world's exported pulp. U.S. demand for market pulp was strong during much of 1983, and continues strong in 1984.

The U.S. market was stirred by a several-month-long strike during the first part of 1984 in British Columbia, where about one-half of Canada's market pulp is produced. A new contract was finally approved on June 30.

During 1984-1986, substantial quantities of new market pulp capacity will be starting up, which will require absorption by strong markets. In 1984, four major and two minor market pulp projects will come online, with a total design capacity of some 1.2 million tpy.

The two largest of these projects, both in the U.S., will produce both hardwood and softwood kraft. The two other new large mills are in Europe, one using pine and the second being eucalyptus-based. The two smaller projects will both produce additional hardwood pulp—one in Brazil and the other in the U.S.

In 1985, a modest-sized pine kraft mill will start up in Central America, and a large softwood and hardwood mill will be put into operation in Finland. Exact capacity is unknown for the Finnish mill, but the total capacity for these two mills is probably close to 300,000 tpy.

In 1986, an all-hardwood kraft market pulp mill, with 260,000 tpy of design capacity, will commence operations in the U.S.

The new design capacity, as outlined above, will total more than 1.7 million tpy, of which about 60% is hardwood pulp. To this should be added 130,000 tpy of capacity in Sweden. The figures given here do not include incremental capacity at existing mills, with the exception of the two substantial projects mentioned. Thus, the total added capacity between 1983 and the end of 1986 could be close to 2 million tpy. The U.S. will be the site of nearly one-half of that new capacity.

U.S. PLANS MAJOR PROJECTS. The U.S. has a unique position in the world market pulp picture. It is the largest consumer and the second largest producer/exporter of market pulp. U.S. 1984 capacity for paper-grade market pulp is reportedly 5.7 million tons, according to American Paper Institute's November 1983 Capacity Survey; actual production in 1983 was 5.1 million tons.

U.S. imports of paper-grade market pulp in 1983 were 2.7 million tons; approximately 95% came from Canada. Total U.S. paper-grade pulp imports last year from Canada were around 3.7 million tons—2.7 million market and 1 million "captive" to affiliated mills.

U.S. exports of paper-grade pulp in 1983, at 2.7 million tons, were close to the top figure for its imports of market pulp. An important difference was that the exports included a considerable quantity of bleached hardwood kraft, while little of this grade was imported.

During 1984-85, U.S. market pulp capacity is expected to increase by about 9%, to 6.2 million tpy. This

Market pulp capacity figures

Market pulp capacity figures have one basic weakness: they apply to mills which produce pulp for the market and those which produce pulp for shipment to affiliated (captive) mills. For such pulp mills, the amount of pulp actually available for sale is reduced when paper demand is high.

Market pulp tonnage figures are reported in three different ways: metric air-dried, metric bone-dry, and short air-dried tons. Because the U.S. is still nonmetric, and because the American Paper Institute uses short tons for its capacity figures, this article reports capacity in short air-dried tons throughout.

The subject of this report is paper-grade chemical market pulp. Dissolving pulps and mechanical pulps are not included. Thus, to avoid frequent repetition, when the term "market pulp" is used "paper-grade chemical market pulp" is meant.

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will rise to about 6.4 million tpy by 1986. These capacity increases are due to two large hardwood/softwood projects scheduled for startup in the fall of 1984, and a large hardwood kraft mill scheduled for 1986. The 1984 projects include the new 1,000-tpd Leaf River mill in Mississippi, and the conversion of International Paper Co.'s, Georgetown, S.C., mill from paperboard to market pulp (850 tpd) and printing papers. In addition, Chesapeake Corp. is increasing its hardwood market pulp capacity by 100 tpd this year.

In 1986, Champion International Corp. will start up its new all-hardwood market pulp mill (750 tpd) in Quinnesec, Mich. It should be noted that all four projects include hardwood kraft. Production of market sulfite pulps is expected to continue declining in the U.S., as is also the case in Nordic countries.

Of the approximately 5.7 million tons of dried papermaking pulps produced in the U.S. during 1983, about one-third was captive, one-third was marketed in the U.S., and one-third was exported.

The state of Maine, a long-time market pulp producer, has been following the pattern of Nordic countries during the last one to two decades. Some paper mills have been expanded, absorbing market pulp capacity at those sites. At others, mill ownership has changed and dried pulp capacity has been converted from market to captive. Some captive/market mills have become integrated, while some older integrated mills have closed their pulping facilities and are dependent entirely upon market or captive pulp. In several cases, producing market pulp mills have been purchased by major pulp and paper companies, with the dried pulp output becoming captive to serve those companies' other mills.

There can be no doubt that the manufacture of pulp for sale in Maine has declined considerably in the past 15 to 20 years, but on the other hand, production of dried pulp for use at affiliated mills has increased substantially more than the drop in market pulp output. Total consumption of dried pulp (market and captive) is now substantially greater than ever before in Maine.

There has been no similar pattern in the Pacific Coast area of the U.S. In the South, some new kraft pulp and paper mills have been built, with the pulp mills having double the requirements of the single paper machines installed. In most of these cases, the excess pulp was dried and sold for several years until a second paper machine was added.

CANADA SLOWS EXPANSION. Canada is the world's largest producer and exporter of chemical paper-grade market pulp, with a 1984 capacity of 7.9 million tpy. Nearly 50% of this capacity, in bleached softwood kraft, is based in British Columbia. Because suitable hardwoods are not available in quantity in this area, hardwood kraft is not produced here.

Three major kraft mill expansions were chiefly responsible for raising annual market pulp capacity by 255,000 tons between 1982 and 1984. These expansions were at Northwood Pulp & Timber Ltd. in Prince George, B.C., Great Lakes Forests Products in Dryden, Ont., and E.B. Eddy Forest Products Ltd. in Espanola, Ont.

Market sulfite pulp capacity will remain steady for 1982 through 1985, according to a recent Canadian Pulp & Paper Assn. survey. It should be noted that Fraser Inc., going against the tide, has modernized and expanded its market sulfite pulp mill at Atholville, N.B. It can now produce 385 tpd of magnesium-based bisulfite pulp.

No major market pulp expansion projects are currently underway or have been announced for Canada. Following the peak for 1984, very modest incremental increases are shown for 1985 and 1986.

More than 90% of Canadian market pulp is produced from northern softwoods, yielding a pulp which obtains a premium price in world markets, as do the softwood pulps from Nordic countries. Canada's position as the leading pulp exporting country is strengthened by the continuing Nordic trend to emphasize production of paper and paperboard in order to obtain a higher return on exports from their limited forest resources.

Since all but a few Canadian paper mills have integrated pulp operations, market pulp shipments to Canadian customers are relatively small, leaving over 90% for export. The U.S. continues to be by far the largest customer for Canadian market pulp, taking approximately one-half the total (plus a substantial quantity of captive pulp for U.S. mills). Japan and Fed. Rep. Germany are, respectively, Canada's second and third largest purchasers of pulp. In terms of offshore regions, western Europe is first and the Far East is second. Relatively small quantities of Canadian pulp are shipped to Latin America or Africa.

The long-term outlook for Canadian market pulp should be excellent, providing costs can be controlled—particularly the demands of Canadian labor unions, notably in British Columbia, where many of the new bleached kraft market pulp mills are located.

The northern grown softwoods provide Canada with a high-quality pulp, similar to that produced in Scandinavia, which commands a premium price. There is a

TABLE 1: **New market pulp mills starting up in 1984 and 1985.**

Mill	Country	Startup	Capacity	Pulp
Leaf River	New Augusta, Miss.	1984	367,000	Bleached hardwood and softwood kraft
Pölser Zellulose & Papierfabrik AG	Austria	1984	140,000	Bleached softwood kraft
Soporcel	Portugal	1984	285,000	Bleached hardwood and softwood kraft
International Paper Co.[1]	Georgetown, S.C.	1984	300,000	Bleached hardwood and softwood kraft
Metsä-Botnia[2]	Aanakoski, Finland	1985	330,000	Bleached hardwood and softwood kraft
Celgusa	El Rancho, Guatemala	1985	110,000	Bleached softwood kraft

1. Mill being converted from paperboard to market pulp.
2. Some of this additional Metsä-Botnia capacity due to its new mill will be captive to its owners.

long-term, built-in preference at many European mills and Far Eastern mills for northern pulp. Canadian producers are in a position to satisfy this preference, and they can only benefit by the reduction in availability of such pulp from Nordic countries (dicussed below).

Canadian kraft mills are moving into bleached hardwood pulps, but much more slowly than several southern U.S. market pulp mills. In fact, the latest Canadian capacity survey indicates a decline in annual hardwood kraft capacity of 90,000 tons between 1984 and 1986, due to a switch to increased softwood kraft production by several companies.

NORDIC DOMESTIC USE UP. Nordic production of market chemical pulp rose from 4.4 million tpy in 1960 to a maximum of 6.8 million tpy in 1973 (a record high), and has steadily declined since then to about 5.5 million tpy for 1980. During the recent recession years, production fell below 5.0 million tpy.

In Finland, there are signs of renewed interest in market pulp, at least partially for domestic consumption. Metsä-Botnia AB, Oy is building a dried bleached kraft (hardwood and softwood) pulp mill at Aanakoski, with a capacity of 330,000 tpy. The new mill is scheduled for startup in 1985. This company, which has a similar plant at Kaskinen, is owned by a consortium of Finnish paper companies. Over one-half the capacity of the two mills (715,000 tpy), is captive to the owners. An estimated 330,000 tpy will be marketed, mainly exported from the older Kaskinen mill, with the output of the new mill directed to the owners' mills (or to the Finnish market). Thus, in this case a Finnish company has more than compensated for increased domestic use by adding a second dried pulp mill. Finland's market pulp capacity (papermaking grades of chemical pulp) is reported to be 1.7 million tpy.

Sweden is reportedly increasing chemical paper-grade market pulp capacity by 130,000 tpy between 1983 and 1986, yielding an annual average increase of about 1.3%.

The overall Nordic pattern of gradual reduction in sales of market paper-grade chemical pulp is completely understandable in view of their desire to move to products of higher value (paper and paperboard). Because of the very limited availability of pulpwood for expansion in Scandinavia, this is not unexpected.

There is strong evidence that market chemimechanical pulps of moderate brightness and moderate strength are being developed to compete with market hardwood kraft pulps in some uses. The key advantage is that yield is in the 85% to 90% range, instead of 40% to 45%. Not only are fibrous raw material costs cut nearly in half, depending partly on whether hardwood or softwood is used, but the capital, maintenance, and staffing costs are much lower for a mechanical pulp mill than for a kraft mill. Evidence to date indicates significant market potential for chemimechanical grades.

TWO PROJECTS IN LATIN AMERICA. Brazil exported close to 1 million tons of market pulp in 1983 (about 135,000 to the U.S. in the past two years). Most of this was bleached hardwood kraft produced principally from plantation-grown eucalyptus, with the balance being largely native gmelina.

Annual production capacity for Brazil in 1983 was 1.68 million tons, with an additional 60,000 tons of eucalyptus pulp capacity being brought onstream by Aracruz during 1984. No other capacity increases of any kind have been announced.

The numerous market pulp projects announced for Brazil five years ago have fallen by the wayside, and it is felt that they are unlikely to be revived in the near future. This is due to Brazil's experience with the volatile nature of the pulp markets (as shown in the recent recession), the high cost of construction, high interest rates, and Brazil's financial difficulties. Nevertheless, Brazil offers a reserve source for pulpwood in market pulp production if and when the major producers in North America and Europe reach fiber source restraints on further capacity additions.

Chile has a 500,000-tpy market pulp capacity, measured in bleached and unbleached pine kraft pulp, almost all of which is exported. The pine is plantation grown, and future plantings, if or when implemented, could provide pulpwood to take care of future domestic requirements and any large capacity expansions.

Manufacturera de Papeles y Cartones SA Cia., of Chile recently announced the beginning of a project to add 35,000 tpy (100 tpd) of bleached pine kraft market pulp capacity at its Laja mill. This will raise the total capacity at Latin America's largest softwood kraft mill. The company announced that capacity may be increased again in the early 1990s when new pine plantations mature.

A Guatemalan company called Celgusa (Cellulosa de Guatemala) is building a 110,000-tpy bleached kraft market pulp mill at El Rancho in Guatemala. The plant may begin operation during 1985. The raw material will be indigenous pine.

SPAIN, PORTUGAL USING EUCALYPTUS. The Iberian peninsula is another growth area for market pulp production, principally bleached hardwood from eucalyptus in both Spain and Portugal.

Portugal's capacity, the larger of the two countries', is about 810,000 tpy and by the end of 1984 should be approximately 1.1 million tpy (with the successful startup of the Soporcel mill this year). This plant will produce both eucalyptus and pine (about half and half) kraft market pulps.

Spain's market pulp capacity is roughly 700,000 tpy, almost entirely eucalyptus kraft pulp. In Spain, about 35% of market pulp output is for export, and 65% is used at home. This means that Portugal's market pulp exports could be about four times that of Spain when the Soporcel mill is up to capacity.

It is obvious that in recent years, bleached eucalyptus kraft pulp has become an important market grade, with an annual capacity of more than 3 million tons for western Europe and South America. It has become a direct competitor with bleached hardwood kraft.

Eucalyptus pulp is said, in general, to have properties similar to southern U.S. hardwood kraft pulps, but as indicated by market prices, it is not of the quality of northern (Canada and Scandinavia) hardwood krafts. The greater uniformity of species in the timber stands of the northern countries makes it easier to pulp the wood for optimum properties.

JAPANESE IMPORTS RISING. Total production of woodpulp in Japan has been declining in recent years and is now down to the level it was 12 years ago. Domestic shipments of market pulp were off 30% during that period.

Between 1970 and 1983, imports of pulp rose more than 125%, or up from 8% to 17% of Japanese pulp consumption. Yet paper and board output showed a very moderate increase. There are several reasons for this doubling of imports:

- The total number of groundwood mills in Japan has decreased from 11 in 1970 to 4 in 1983.
- High manufacturing costs in Japan, for both integrated and market pulp mills, combined with the low value of the dollar vs the yen (pulp prices are customarily quoted in U.S. dollars throughout the western world), have meant that Japanese mills could frequently purchase foreign pulp more cheaply than they could produce it.
- Integration of pulp mills into paper or board manufacture has been a factor in reducing the amount of Japanese-produced market pulp available.

Another factor affecting Japanese market pulp production and imports has been Japan's increase in wastepaper usage. This has grown from 35% of fiber furnish used for paper and board manufacture in 1970 to around 45% in 1982. A similar increase is unlikely for the next 12 years since, in the collection of wastepaper, there is a "law of diminishing returns" effect.

> ***The extremely high cost of constructing new market pulp mills will, in the future, be a deterrent to a large buildup of excess market pulp capacity worldwide. The limited availability of softwood stands for pulping in the western world should mean continued growth in hardwood market pulp.***

Next to the U.S. and the Fed. Rep. Germany, Japan is the world's largest importer of papermaking pulp, importing approximately 1.8 million tons in 1983. The Japanese mills seem to prefer northern bleached kraft pulp, which makes Canada the leading supplier of pulp to Japan, with the U.S. coming in a strong second.

Some Japanese companies have sought to protect their imported pulp requirements by entering into joint ventures for new dried pulp mills abroad. Japan has three such projects in operation for bleached kraft—two in Canada and one in Brazil. Bleached kraft pulp from the Brazilian mill is produced from eucalyptus. Pulp from this mill, shipped to its Japanese co-owners, probably makes up the bulk of the Japanese pulp imports from Brazil, which in 1983 amounted to about 200,000 tons. This makes Brazil the third largest supplier of pulp to Japan.

There are also three such joint ventures producing mechanical pulp—two in Canada and one in New Zealand. These joint ventures are reported to be responsible for approximately 30% of total papermaking pulp imports by Japan. It would appear that pulp imports into Japan will continue to grow, but at a slower rate than in recent years.

SOVIET SUPPLIES TIGHT. The immense softwood forest resources of Russia reportedly amount to 60% of the world total. Eventually, these may provide some needed pulp for world markets.

For the present, however, it appears that a Soviet five-year plan for pulp and paper expansion is well behind schedule. As a result, after supplying its expanding needs and those of its satellite countries, there is little Soviet pulp available to market, except when pulp is squeezed out of internal needs to export for political or foreign exchange reasons.

Soviet foreign trade statistics indicate that France was the only western nation to purchase Soviet market pulp in 1980 and 1981.

New mills are being concentrated in the heavily forested areas of Asian U.S.S.R. Thus, if and when a major effort is made to enter strongly into the pulp market, it is most likely to be directed at such major Asian importing countries as Japan, Korea, and China.

When the communist countries have ample supplies of market pulp to export, times may be happier, and the western world will be pleased to make paper from Soviet pulp.

MEDIUM-, LONG-TERM OUTLOOK. The 1984 scheduled startup of known new facilities designed to produce in excess of 700,000 tpy of hardwood kraft market pulp, coupled with the startup in 1986 of a new hardwood kraft pulp mill designed for 260,000 tpy (resulting in approximately 1 million additional tons), should provide ample supplies of this pulp for a few years. About 60% of this new capacity will be based in the U.S.

The possibility of a serious shortage of market pulp in world markets is unlikely, at least during the balance of this century. Canada, which is by far the world's largest exporter of market pulp, has sufficient softwood resources for substantial new market pulp capacity and has hardly begun to tap its very considerable stands of hardwood east of the Rocky Mountains.

The fast growth rate of plantation eucalyptus has proved the economic viability of marketing bleached hardwood kraft from this species. Brazil, Portugal, and Spain have demonstrated this from forestry to marketability. There is potential for major capacity expansion in all three countries.

The extremely high cost of constructing new market pulp mills will, in the future, be a deterrent to a large buildup of excess market pulp capacity worldwide. The limited availability of softwood stands for pulping in the western world should mean continued growth in hardwood market pulp.

Use of bleached chemimechanical market pulp, both from softwoods and hardwoods, is just beginning, but could see strong growth because of the lower capital costs and the fact that pulp yield from wood is nearly double that of bleached kraft.

In the long term, softwood kraft will command a high premium. In the very long term, the truly immense softwood forests of the U.S.S.R. should become a major world source of softwood kraft. ■

ISSUE FOCUS:

World Review

World TiO_2 pigment supply seen tightening through this decade

Economic and environmental constraints have caused plant closures in the U.S. and Europe, discouraging new capacity investments

By FRED MONTANARI

■ The titanium dioxide (TiO_2) pigment business today must be viewed from a global perspective, as international supply and demand considerations are having a significant impact on the market. Demand for the pigment (used to add whiteness, brightness, and opacity to paper) is closely correlated to growth in both population and GNP—while supply continues at a relatively constant level, based primarily on the effective capacity of existing plants. This situation will lead to an increased tightening of an already tight TiO_2 supply. This article presents a detailed analysis of the TiO_2 market, the interactions between geographic areas, environmental restraints, and supply capability.

Before 1970, the TiO_2 industry grew at an annual rate of 5% to 15%. Many factors have led to reduced growth rates in the past decade: changes in consumption patterns, industry maturity, and an overall reduction in growth of industrial activity in developed countries.

A correlation of TiO_2 consumption with GNP shows that per capita consumption has leveled off in the U.S. (Figure 1). Although specific market sectors may exceed GNP growth, the overall growth rates experienced in the past will not return.

A similar situation is expected in western Europe, where the variability in exports of TiO_2-containing products and a somewhat different end-use market distribution will have minor impact on the demand pattern. Growth rates in the rest of the world will be faster because these nations are in the steeper portions of the per capita consumption graph. They are improving their standard of living and demanding more "quality of life"

FIGURE 1: **TiO_2 consumption as a function of GNP in the U.S.**

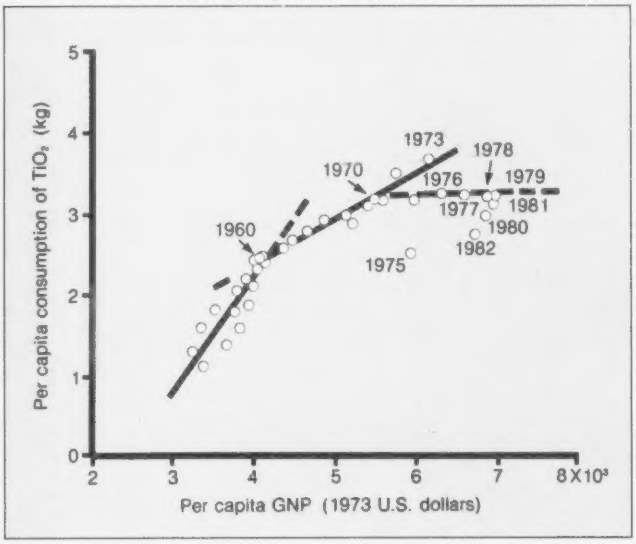


TABLE 1: **End-use market growth.**

End-use market	United States	Western Europe	Rest of world
Coatings	+1.5% /yr.	+1.0% /yr.	+3.5% /yr.
Plastics	+3.5% /yr.	+2.0% /yr.	+6.0% /yr.
Paper	+2.0% /yr.	+1.0% /yr.	+1.2% /yr.
Other	+2.4% /yr.	+1.0% /yr.	+2.5% /yr.
Average	+2.0% /yr.	+1.3% /yr.	+3.5% /yr.

Worldwide: 2.3% /year

TABLE 2: **U.S. TiO_2 pigment market recession and recovery.**

Market	Recession 1982 vs 1981	Recovery 1983 vs 1982	CAG (%) 1981-1983
Coatings	−9.2%	12.0%	0.8%
Paper	0.4%	11.8%	5.9%
Plastics	−2.5%	12.8%	4.9%
Other	−1.9%	3.4%	0.7%
Weighted average	−4.9%	11.2%	2.8%
TiO_2	−11.2%	18.9%	2.8%
GNP	−1.9%	3.4%	0.7%

Mr. Montanari is executive vice president, NL Industries Inc., Hightstown, N.J.

products containing titanium dioxide. The major constraint on demand growth in these markets will be the availability of hard currency to purchase products or build capacity.

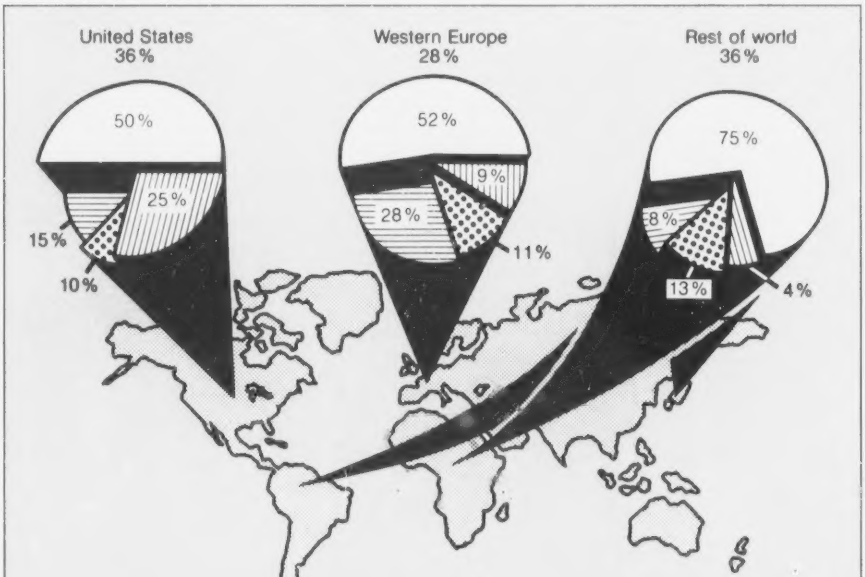
An examination of TiO_2 business segments by end-use industries and geographic area reveals a world marketplace divided into three major segments: the U.S., western Europe, and the rest of world (Figure 2). Coatings are the predominant end-use industry in each market area. Use of the pigment in the plastics industry is also a strong and growing component of each market. The large consumption of TiO_2 in the U.S. paper industry is due to the heavy use of coated paper in magazines and catalogs, and the use of uncoated paper in copiers and computer print-outs. The "other" category includes the fibers, ceramics, rubber, and cosmetics industries, and in the aggregate represents a large market requiring special-purpose TiO_2 grades.

Trend lines for each geographic area can be developed by combining these data with end-market growth rates (Table 1) A slow (1+%) growth is projected for western Europe, and a 2% growth is predicted for the U.S. Growth in the rest of the world market area (3.5%) will be higher than in both the U.S. and western Europe, as quality of life in developing countries and per capita consumption continues to improve.

ECONOMIC/ENVIRONMENTAL INFLUENCES. Table 2 illustrates how the TiO_2 consumption in the U.S. was affected by short-range economic disruptions. The percent change during the recession of 1982 for all TiO_2-consuming business segments was negative, with the exception of paper, which showed a small improvement. The recovery period of 1983 produced strong growth in all areas.

Due to the usual phenomenon of inventory drawdown-rebuild, the TiO_2 market dropped faster than the GNP during the recession, then rebounded faster than the GNP during recovery. An interesting fact is that overall growth during the entire recession/recovery period corresponds to a normal slow but sustained growth pattern despite a lower than normal inventory rebuild.

FIGURE 2: **End-use markets.**



The TiO_2 imports and exports graph shows the movement of product in 1983 between the U.S., western Europe, and the rest of the world (Figure 3). Capacity figures cited in this illustration are based on effective capacity—production rates that can be sustained—not nameplate capacity.

The U.S. has been, and will continue to be, a net importer of TiO_2 pigment. Western Europe, which produces 40% more of the pigment than it can consume, must export to the U.S. and the rest of the world. This interdependence of geographic areas is extremely important for the existence of a stable supply situation.

The major environmental concern associated with titanium dioxide manufacture is the disposal of large volumes of acidic-iron wastes. This disposal problem, in a very general sense, is inversely proportional to the titanium content of the process feed material.

Geographic location has been an important determining factor in the selection of methods used to control effects of waste-disposal operations. Locations of the most recently constructed plants have been dictated, to a large extent, by environmental considerations. However, many plants around the world recycle significant percentages of waste acid and discharge the remainder to waters that have high assimilative capacities. Plants in Europe and the U.S. have been successful in their efforts to sell the useful iron byproducts, thus reducing the disposal problems. Plants in the U.S. dispose of waste effluents in a variety of ways, including discharge into the earth's crust via deep well injection.

The current attempt by the European Economic Community to "harmonize" an effluent control program illustrates the potential effect that environmental issues can have on the supply of titanium dioxide.

Extensive studies have been performed on many of the methods currently used to dispose of liquid wastes from TiO_2 pigment plants in rivers and oceans. These studies indicate that no substantive damage is occurring to the receiving marine ecosystems. Nevertheless, political pressures, as typified by the zero-discharge concept in European Economic Community TiO_2 Directive, resulted in substantial commitments being made for alternative disposal methods.

When unilateral action is taken by any country, that action is extremely disruptive to the market. Fed. Rep. Germany has mandated an end to ocean disposal by 1990. In England, on the other hand, no change in the existing effluent discharge method is felt to be necessary. Other European countries have intermediate stands on this issue. Harmonization of programs by the European Economic Community is necessary to achieve environmental goals without unfairly penalizing individual manufacturers, or, in the extreme case, causing plant shutdowns.

OVERALL SUPPLY/DEMAND TRENDS. Projecting capacity and demand figures into 1988 produces a sobering picture (Figure 4). Supply will be strained to keep up with demand. The high cost of operating older plants has resulted in production curtailments. Plants have been shut down in both the U.S. and Europe, and remaining facilities require capital investment in expensive effluent control equipment. A tightening supply trend has been developing which is already putting pressure on plants to attain full effective capacity.

Major producers are evaluating incremental expansions and working on streamlining operations. A few more years of tight supply may encourage consideration of new plant capacity. But current profit margins and high capital costs discourage large investments in this industry and provide insufficient economic incentive for construction of large scale "grass roots" plants. To bring a new 100,000-ton facility onstream would require an estimated capital investment of $150 million to $200 million and four to five years for completion.

All major suppliers have contingency plans to respond to any unusual increases in demand, but present world capacity is fixed for the 1980s, especially in the U.S. and western Europe. Examples of local disruptions due to mechanical problems and threatened environmental shutdowns have become all too common. Customers must therefore become more cognizant of international supplies for TiO_2, and it appears that, unless there is a recession of significant proportions, TiO_2 will be in a delicate supply/demand balance for the remainder of the 1980s. ■

FIGURE 3: **1983 TiO_2 imports and exports.**

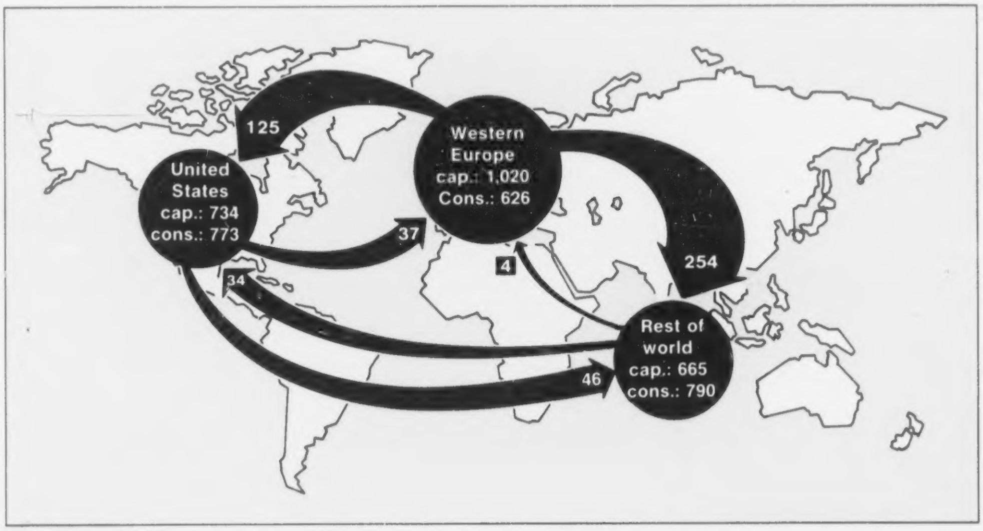
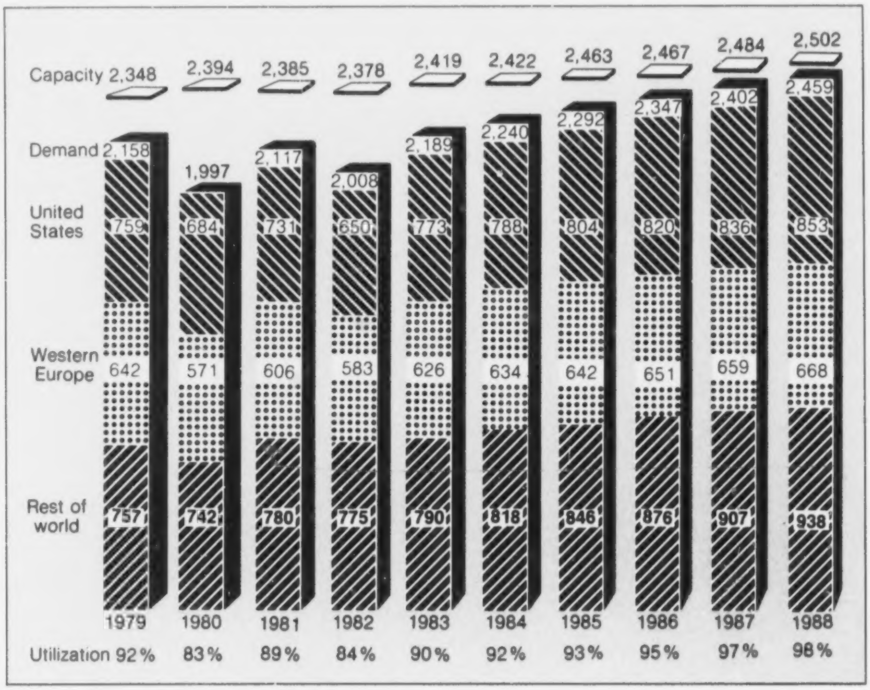


FIGURE 4: **TiO_2 pigment supply/demand projections.**



Sodium sulfate markets recovering slightly in 1984

By BARRY SHOCKETT

Sparked mainly by the detergent industry, total sodium sulfate demand is expected to rise about 5% in 1984. However the long-range forecast for growth in the domestic market is only about 1.5%/yr. Last year's sharp decrease in mill consumption was attributed mainly to the inroads of emulsified sulfur and caustic as a cheaper replacement for saltcake.

The 26% drop in Canadian exports in 1983 was directly related to the decreased U.S. mill demand. As a result, last year's production of natural sulfate was down almost 110,000 tons.

U.S. statistics, sodium sulfate (000 short tons)

	1981r	1982r	1983	1984e
Capacity				
Natural	620[1]	470[2]	460[1]	460
Synthetic (byproduct)	600	600	550	550
Production				
Natural	608	410	400	390
Synthetic	503	454	455	500
Inventory change (year-end)	−33	+36	−18	+8
Imports	291	391.5	343.5	300
Exports	124	111	90.5	85
Apparent consumption	1,245	1,180.5	1,060.5	1,113
Pulp and paper	597.5	566.5	498.5	495
Detergents	485.5	460.5	434	490
Other (glass and miscellaneous)	162	153.5	138	128

1. 400-short-ton plant closed April 1981, reopened January 1983. r=Revised. e=Estimated.
2. 2,000-short-ton plant closed March 1982.
Sources: Bureau of Mines, U.S. Dept. of the Interior; Bureau of Census, U.S. Dept. of Commerce.

Canadian statistics, sodium sulfate (000 short tons)

	1981r	1982r	1983	1984e
Capacity[1]	940	944.5	896[2]	872
Production	699	680	589	613
Inventory change	−42	−8	+8	+22
Imports	14	19	25	24
Exports	313.5	364	269	275.5
Apparent consumption	357.5	327	353	383.5
Pulping	281.5	252.5	279	308.5
Detergents	50.5	51.5	49	49.5
Other[3]	23.5	23	25	25.5

1. Includes 1,070-short-ton byproduct capacity. r=Revised. e=Estimated.
2. 500-short-ton plant closed May 1983.
3. Including glass, textiles, animal feeds, miscellaneous.

SODIUM SULFATE

UNITED STATES

Uses: Sodium sulfate (saltcake) is the main source of makeup sodium and sulfur for kraft pulp mills. It is also utilized by the glass industry and for detergents.

Demand: In 1983, pulp mill demand for sodium sulfate dropped to 498,500 tons, down 12% from 1982. Detergent applications accounted for an estimated 434,000 tons. Mill usage is expected to decrease slightly in 1984.

Sources: Three firms mine natural sodium sulfate—Great Salt Lake Minerals & Chemicals, Ozark-Mahoning (Div. of Pennwalt), and Kerr-McGee Chemical. Great Salt Lake has had some problems lately, resulting in extensive downtime. Three byproduct producers have closed their plants. The major byproduct producers now include Akzona, Allied Chemical, Avtex, Climax Chemical, Diamond Shamrock, and Lithium.

Availability: Ozark Mahoning's expansion program and the expected growth in byproduct sulfate output should ensure an adequate supply for the mid-term. 1984, market; 1983, tight to market; 1982, market to tight; 1981, market; 1980, tight to market.

Pricing: The lists established on Jan. 1, 1983—$91/ton in the South and $99/ton on the West Coast—have not changed. Canadian saltcake for export to the U.S. is also still listed at its Jan. 1, 1983 price of C$82/ton, f.o.b. mine. Price history: 1983, $99/ton, f.o.b. works, freight equalized; 1982, $79-$94/ton; 1981, $68-$79/ton; 1980, $60-$68/ton.

Forecast: Production of byproduct sulfate should increase about 10% in 1984, while natural output continues to decline.

CANADA

Uses: Kraft pulp mills consume most of the saltcake in Canada. The next largest end use being the detergent industry.

Demand: Canadian pulp mills consumed about 279,000 tons of saltcake in 1983, compared with the 252,500 tons purchased in 1982. In 1984, mills are forecasting an increase in demand of almost 30,000 tons.

Sources: Five natural sulfate producers (listed in descending order of nameplate) are Saskatchewan Minerals, Hudson Bay Mining & Smelting's Francana Minerals Div., and Midwest Chemicals, while Alberta Sulphate and Ormiston Mining have similar capacities. The two byproduct producers, accounting for 12% of total capacity, are Courtaulds and Ontario Paper.

Availability: With 25% to 30% of surplus capacity available for the next few years, no shortages are expected. 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: The price of domestic saltcake has remained steady at $81/ton since Apr. 1, 1983, and will probably continue at that level for the balance of 1984. Price history: 1983, $75-$81/ton, bulk, f.o.b. production point; 1982, $70-$75/ton; 1981, $55-$70/ton; 1980, $50-$55/ton; 1979, $50/ton.

Forecast: The pulp and paper industry's share of total sodium sulfate demand has averaged 78% over the past three years and is expected to reach the 80% level in 1984. In the long term, however, mill usage should decline about 2%/yr.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

PULP & PAPER

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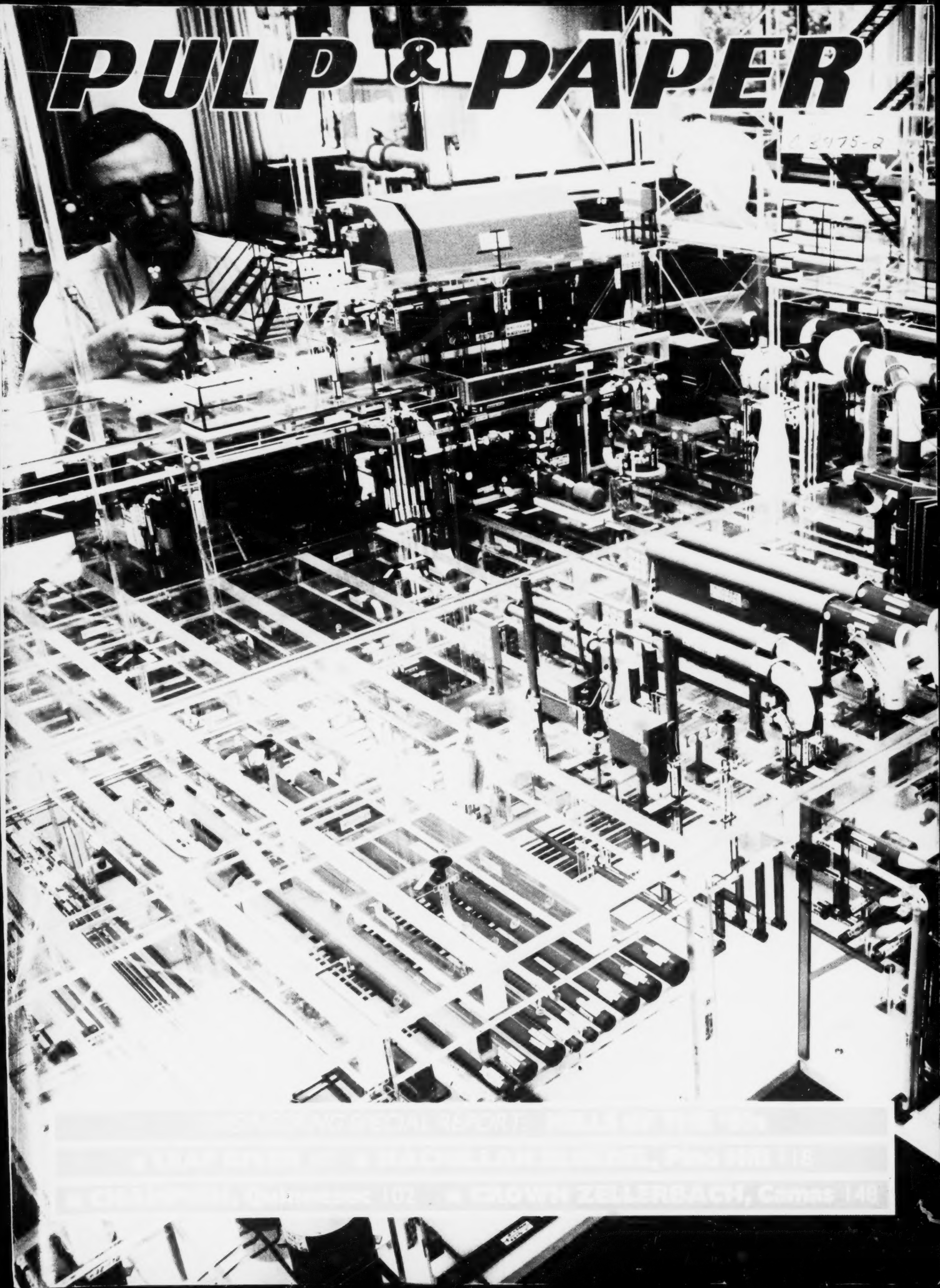

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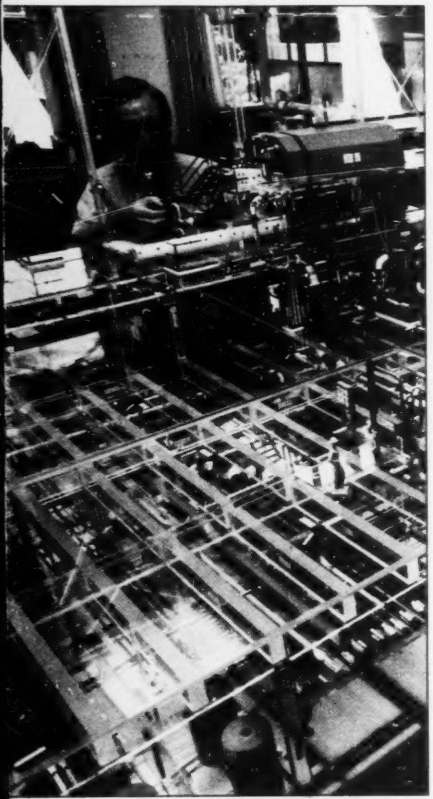

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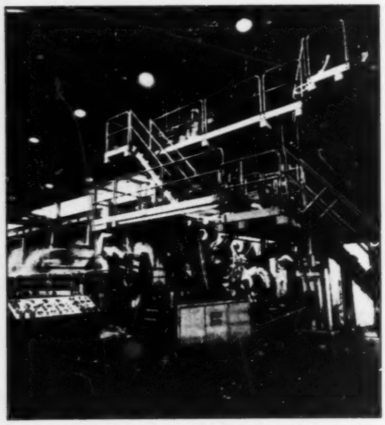

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COVER: *This model by Rust Engineering—only one of several models commissioned by Crown Zellerbach at a cost of over $1 million to facilitate its Camas modernization project—exemplifies the state-of-the-art approach typical of "Mills of the '80s." (Photo courtesy of Crown Zellerbach.)*

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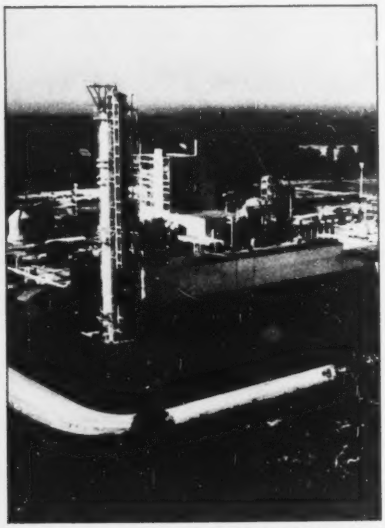

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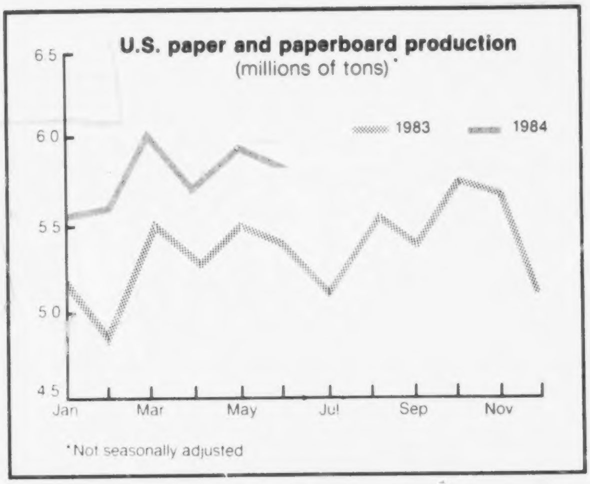
MONTH IN STATISTICS

U.S. paper and paperboard production continued at close to capacity levels up until the start of the July vacation period, according to the American Paper Institute. Production in the first half of 1984 was a record 35 million tons, 9% above the level of the same 1983 period, which was also a record. With seasonal adjustment, the rate of production in the first six months of 1984 was 68.4 million tpy, 5% over the average rate for the full year of 1983. New capacity coming onsteam in the second half of the year—mostly in the printing/writing grades and particularly uncoated free sheet—will permit additional increases in production.

Among major grades, production of paperboard in the first half was 10% above the year-ago level, with production of containerboard for domestic use up almost 13% and boxboard production for domestic use up 8%.

Canadian newsprint shipments rose 9.7% in June compared with June 1983 and up 9% in the January-June period compared with the same 1983 period. Operating rates in June were 98%, up from 93% in the previous year.


U.S. paper and paperboard production
(millions of tons)*

*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	June	468	14.1	5,606	9.5
Uncoated groundwood (s)	June	143	13.5	1,624	9.3
Coated paper (s)	June	518	11.9	6,251	15.7
Uncoated free sheet (s)	June	750	3.7	9,327	6.9
Unbleached kraft packaging and industrial (s)	June	316	1.9	3,951	6.2
Tissue	June	406	0.5	4,882	2.8
Total paper	**June**	**2,881**	**6.3**	**35,131**	**8.5**
Kraft linerboard, unbleached	June	1,389	12.4	16,259	10.1
Semichemical medium	June	443	11.9	5,197	12.1
Bleached paperboard	June	343	5.2	4,116	4.1
Recycled paperboard	June	673	9.4	8,209	12.2
Total paperboard	**June**	**2,856**	**6.8**	**33,993**	**9.4**
Total paper and paperboard[5]	**June**	**5,837**	**8.4**	**70,109**	**8.2**
PULP, WASTEPAPER & FIBER [2]					
Total woodpulp production	May	4,769	5.5	56,164	8.0
Market pulp production	May	560	3.9	6,813	5.7
Wastepaper consumption at paper/board mills	May	1,389	13.8	16,005	11.3
Pulpwood consumption (cords)	May	7,439	11.1	88,615	4.6
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	June	22.387	1.7	135.051[6]	9.0
Containerboard inventories at box plants	June	2,541	3.2		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	May	929	24.5	10,465	25.5
Imports of Canadian newsprint	May	616	3.2	7,247[6]	11.4
U.S. paper exports (including products)	May	430	3.6	4,458	−1.5
Exports of unbleached kraft linerboard	June	178	4.8	2,085	−10.9
Exports of woodpulp	May	336	−11.1	3,687	2.8
CANADIAN STATISTICS [4] (reported in metric tons)					
Total newsprint shipments	June	872	9.7	4,441[6]	9.0
Operating rates	June	97%	88%	89%	83%
Inventories held by U.S. consumers	June 30	1.4	11.3		
Woodpulp shipments (export only)	June	614	−6.3	3,166[6]	1.9
Operating rates	June	98%	93%	81%	83%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Uncoated groundwood paper:
good times ahead

Statistics:	**1982**	**1983**	**1984e**
Production, 000 tons[1]	7,847	8,680	9,040
Capacity, 000 tons	9,039	9,179	9,554
Utilization rate, %	86.8	94.6	94.6
Imports, 000 tons	169	220	210
Exports, 000 tons	71	60	60
Apparent U.S. consumption			
000 tons	7,945	8,840	9,190
lb/capita	68.7	75.7	78.0
000 tons/$ billion real GNP (1972)	5.35	5.75	5.75

[1] American Paper Institute data for shipment.
e = *Pulp & Paper* estimate.

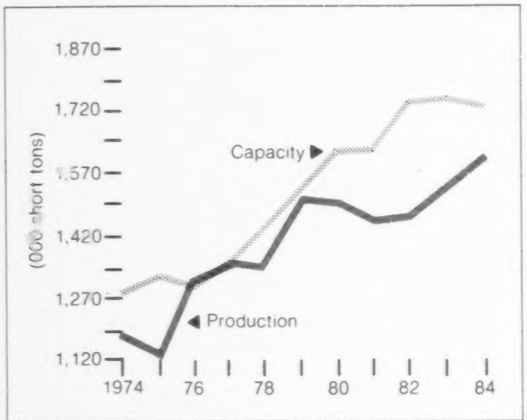
GRADE STRUCTURE: Uncoated groundwood paper is similar to newsprint in terms of physical properties. The two grades constitute the low-cost end of the printing paper spectrum. Uncoated groundwood paper has greater endurance and higher brightness—typically 64 to 72 Elrepho compared with 56 to 62 for newsprint. Typical end uses include Sunday supplements, magazines, directories, catalogs, inserts and other advertising circulars, and forms paper. Basis weight range is 20 lb to 45 lb/3,300 ft².

PRODUCTION/CAPACITY: In 1982 U.S. production of uncoated groundwood paper finally reached and exceeded the record formerly achieved in 1979, and in 1984 it seems headed to a new peak of more than 1.6 million short tons. Canadian production also seems likely to achieve a new record—almost 900,000 tons.

Canadian figures should be used only for annual comparisons, however, since Canadian Pulp & Paper Assn. numbers greatly distort actual levels of operation: U.S. government definitions of newsprint permit Canada to hide a substantial portion of its uncoated groundwood output within the newsprint category. Thus, while CPPA estimates 1984 capacity at 926,000 short tons, *P&P* believes a more accurate number would be 2.1 million tons.

Further complicating capacity figures is the question of swing machines. American Paper Institute's latest available capacity survey places U.S. capacity at 1.622 million tons for 1984, but *P&P* estimates actual capacity this year at closer to 1.733 million tons—partly because machines can be kept busier making uncoated groundwood than they can making newsprint. Also, in a busy market, extra capacity can sometimes be found simply by stinting on maintenance.

OUTLOOK: Recovery was fully under way in uncoated groundwood markets in 1984 and should continue through 1985 as well, barring a recession. By one estimate, U.S. imports from overseas may hit 300,000 tons this year without hurting North American mills at all. Virtually all major markets—Sunday supplements, catalogs, and inserts in particular—face tight paper supply situations, and even telephone directories are expected to resume consumption growth following several years of successful conservation efforts.



Estimated capacities of major companies are:

	Annual capacity (000 short tons) U.S.	Canada	Total	Capacity N. American market %
1. Abitibi-Price	—	500	500	13.1
2. CIP	—	380	380	10.0
3. Great Northern Nekoosa	380	—	380	10.0
4. Consolidated-Bathurst	—	370	370	9.7
5. MacMillan Bloedel	—	330	330	8.7
6. Boise Cascade	40	260	300	7.9
7. St. Regis[1]	220	—	220	5.8
8. Domtar	—	210	210	5.5
9. Madison Paper Industries	200	—	200	5.2
10. Fraser	135	—	135	3.5
11. Crown Zellerbach	130	—	130	3.4
12. Kimberly-Clark	95	30	125	3.3
13. Bowater	70	—	70	1.8
14. Pejepscot Paper[2]	56	—	56	1.5

North American capacity (1984): 3.813 million tons (U.S. 1.733; Canada 2.080)
Capacity share of top five companies: 51.4%
Capacity share of top ten companies: 79.3%

[1] Includes 34,000 tpy at Hennepin Paper Co.
[2] Subsidiary of Hearst Corp.

PRICING: Prices returned to prerecession levels in 1983 and 1984, helped in part by coated paper mills' success at raising their quotes. List prices for some groundwood grades ($/short ton) are: 25-lb roto catalog—1974, $320; 1975, $320; 1976, $345; 1977, $405; 1978, $425; 1979, $468; 1980, $495; 1981, $551; 1982, $551; 1983, $600; third-quarter 1984, $680. 30-lb standard roto news—1978, $345; 1979, $386; 1980, $427; 1981, $490; 1982, $505; 1983, $505; third-quarter 1984, $520.

(News section continues on page 27)

SALES AND EARNINGS

No end in sight to paper industry gains

Strong demand, rising prices, and high shipments continued to push up sales and earnings in the U.S. paper and forest products industry in the second quarter. Earnings of 34 companies surveyed by *Pulp & Paper* shot up 78%, to $1.0 billion, compared with the second quarter of 1983, while sales grew a healthy 24%, to $18.4 billion.

The rise in sales and earnings of the 27 paper companies surveyed was even more spectacular: sales were up 32% and earnings 88% compared with the 1983 period. Of the seven companies surveyed that primarily produce forest products, sales increased 11% and earnings 56%, with the performance of paper operations offsetting weakness in wood product prices.

Second-quarter results of U.S. paper and forest products companies.

	Second quarter ($000)			
Paper companies	**Sales**	**Change 1984/83**	**Earnings[1]**	**Change 1984/83**
Bowater	$258,278	34.6%	$16,553	62.3%
Chesapeake	84,386	33.5	6,100	155.3
Consolidated	175,987	23.5	20,657	72.1
Crown Zellerbach	776,400	19.0	32,500	62.5
Federal Paper (6/16)[2]	146,170	13.4	8,254	424.1
Fort Howard	357,208[3]	143.7	35,028[4]	39.4
Glatfelter	88,097	40.1	10,563	111.6
GN Nekoosa	477,300	22.5	35,100	61.8
Hammermill	453,384	26.1	16,965	185.1
Int'l. Paper	1,228,700	14.5	67,000	34.5[5]
James River (4/29)[2]	2,301,076	38.9	97,995	77.7
Jefferson Smurfit	176,335	21.6	6,055	1,480.9
Kimberly-Clark	891,200	7.9	58,900	25.3
Longview (4/30)[2]	126,905	49.9	7,179	679.5
Mead	726,300	15.8	46,100	401.1
Mosinee	52,727	119.1	2,307	64.4
Pentair	143,283	94.0	5,993	113.3
St. Regis	815,146	16.5	39,402	278[6]
Scott	637,816	3.9	52,862	60.0
Sonoco	189,643	12.2	12,102	89.3
SW Forest	209,603	28.4	5,562	2,874.3
Stone Container	313,913[3]	142.1	9,446[3]	500.9
Temple-Inland	329,400	9.5	28,800	148.3
Union Camp	507,682	20.9	51,331	64.8
Wausau	55,135	20.9	2,131	158.3
Westvaco	446,935	24.4	28,234	154.2
Willamette	304,083	11.0	16,753	238.2
Total	**12,273,092**	**31.8**	**719,872**	**88.4**
Forest products				
Boise Cascade	998,730	14.9	33,520	97.5
Champion Int'l.	1,151,862	8.5	40,062	56.7
Georgia-Pacific	1,823,000	7.3	84,000	50.0
Louis.-Pacific	324,650	9.8	7,520	−38.1
Pope & Talbot	78,602	0.4	2,627	−41.1
Potlatch	258,605	13.8	15,930	60.8
Weyerhaeuser	1,471,297	14.8	103,872	75.7
Total	**6,106,746**	**10.8**	**287,531**	**56.1**
U.S. total	**18,379,838**	**24.0**	**1,007,403**	**77.9**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. Period ending.
3. 1984 figures include a major acquisition.
4. Includes a charge of $6,000,000 from the consolidation of facilities and write-offs of equipment and inventory.
5. Includes a pretax gain of $15,700,000 in the 1983 quarter from the sale of land.
6. 1983 figure includes a gain of $2,455,000 from sale of certain timberlands and a gain of $11,000,000 from sale of tax benefits.

"We continue to experience softness in the wood products side of our business," said Edwin A. Gee, chairman and CEO of International Paper Co. "Improvement in the other operating segments, however, has been consistent since third-quarter 1983. We are achieving our earnings projections and are optimistic this trend will continue," Dr. Gee said. IP's sales were up 15%, to $1.2 billion, and earnings rose 35%, to $67 million.

White papers lead. Coated papers did particularly well in the second quarter. Earnings of Consolidated Papers Inc., a major coated papers manufacturer, rose 72%, to $21 million, compared with the 1983 quarter. The second quarter for Mead Corp., also a major coated papers producer, was a record one for the company—the earnings of $46 million exceeded the 1983 quarter by 401%.

Containerboard was also very strong in the quarter. Stone Container Corp. registered a 501% increase in earnings on a 142% jump in sales, reflecting the acquisition of three large unbleached kraft mills and related converting operations from Continental Forest Industries Inc. last year. Results also benefitted from higher prices and shipments, noted Roger W. Stone, chairman and CEO.

Peter J. McLaughlin, chairman and CEO of Union Camp Corp., manufacturer of containerboard and white papers, said, "Looking ahead to the rest of the year, we see a continuation of the first half's strong performance. Not only do we see strong demand, but we also expect to realize further needed price improvement, particularly in linerboard and corrugated containers."

Competitive tissue market. Tissue demand was strong, but prices continued to be very competitive. "Business conditions within the industry have, for all practical purposes, remained unchanged, and we are still facing a highly competitive marketplace that is price sensitive," noted Paul J. Schierl, president and CEO of Fort Howard Paper Co. The company nevertheless posted a 39% increase in earnings on a 144% rise in sales (boosted by the acquisition of Maryland Cup Corp. in 1983).

Kimberly-Clark Corp. posted an 8% increase in sales on a 25% rise in earnings, while Scott Paper Co. recorded a 60% increase in earnings on a 4% rise in sales, showing improved operating efficiencies and a strong performance from its S.D. Warren Div. coated and uncoated printing papers.

Wood products glut. The only two decreases in earnings were by two forest products companies—Louisiana-Pacific Corp. and Pope & Talbot Inc.—down 38% and 41%, respectively."The anticipation of a strong housing market led to a major overreaction on the part of both U.S. wood products producers and their Canadian counterparts," said L-P chairman and president, Harry A. Merlo.

Champion International Inc.'s sales were up about 9%, to $1.152 billion, and earnings 57%, to $40 million. "Our paper business is excellent and packaging has improved significantly," said chairman and CEO, Andrew C. Sigler. "But the building products business is a real concern."

Canadian results differ in East, West

Eastern Canadian paper companies surveyed by *Pulp & Paper* experienced strong second-quarter gains in sales and earnings, contrasting with western companies whose results were dragged down by weak lumber prices. For the 11 Canadian companies surveyed, sales were C$3.2 billion, up 11.4% from the second quarter of 1983, and earnings were C$882 million, compared with C$43.2 million in 1983.

Eastern Canadian companies' sales and earnings were boosted by healthier newsprint and kraft pulp markets and the strong U.S. dollar. Abitibi-Price Inc.'s sales jumped 31%, to $586.6 million, and earnings rose 74%, to $20.7 million, including a loss from the sale of Abitibi's Sault Ste. Marie, Ont., groundwood papers mill. According to Abitibi chairman and CEO, R.C. Gimlin, the results were due to growth in U.S. newsprint consumption, up more than 8% over 1983, and improvement in newsprint sales, including a surge in orders before the July 1 price increase to $535/ton.

"We look forward to good earnings for the balance of the year, particularly if, as predicted, the U.S. exchange rate remains near present levels," said Gimlin.

Consolidated-Bathurst Inc. attributed its increase in earnings—up 118.7% to $19.9 million—to better foreign exchange rates, higher shipments and increased prices in newsprint and groundwood specialties, improved margins in bleached pulp, and higher shipments of glass containers. Con-Bath's sales were up 19.9%, to $438.9 million.

The higher level of housing starts in the U.S. helped push Domtar Inc.'s sales up 16.1% compared with the 1983 quarter, to $522.5 million, and earnings up 172.2%, to $24.5 million. Sales of Domtar's construction materials group increased 39% due to strong demand in the U.S. for gypsum wallboard. Sales of the pulp and paper group rose 17%, excluding a business sold in 1983, primarily because of improved prices. The packaging group's sales increased 19% as a result of a higher sales volume of corrugated containers, improved prices, and better operating efficiencies.

Canadian paper industry results.

	Second quarter (C$000)			
Paper companies	**Sales**	**Change 1984/83**	**Earnings[1]**	**Change 1984/83**
Abitibi	C$586,572	31.0%	C$20,666[2]	74.0%
B.C. Forest	262,700	9.7	5,400	n.m.
Canfor	271,700	−5.2	200	n.m.
Con-Bathurst	438,900	19.9	19,900[3]	118.7
Domtar	522,500	16.1	24,500	172.2
Donohue	119,000	30.5	7,500	400
Fraser	135,900	25.1	8,300	76.6
Great Lakes	157,052	21.1	4,410	n.m.
Mac. Bloedel	534,200	−8.5	5,300	−54.7
Rolland	70,528	25.4	2,326	51.3
Weldwood	147,987	−5.4	785	−88.5
Canadian total	**3,247,039**	**11.4**	**882,002**	**n.m.**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. Includes $2,350,000 loss from sale of Sault Ste. Marie mill.
3. Before extraordinary credit of $10.9 million.

(   ) = loss. n.m. = Not meaningful.

Domtar expects "continuity" of its financial results in the second half of 1984, said D.J. Speirs, v.p.-finance and corporate development. But results will be affected by the Canadian Paperworkers Union strike at Domtar's Lebel-sur-Quevillon, Que., mill, which has forced Domtar to buy pulp for its fine-paper operations from other suppliers.

Hard times in the West. Sales and earnings of the four paper companies surveyed in western Canada were held back by depressed wood product prices. MacMillan Bloedel Ltd.'s second-quarter sales of $534.2 million were down 8.5% from the 1983 quarter. Earnings fell 54.7%, to $5.3 million. Pulp, newsprint and containerboard markets continued to be favorable, said president and CEO, Ray Smith, but lumber markets deteriorated significantly.

Weldwood also suffered drops in sales and earnings compared with the second quarter of 1983. Sales fell 5.4%, to $148 million, and earnings dropped 88.5%, to $800,000. Canadian Forest Products Ltd. recorded sales of $271.7 million, down 5.2%, and earnings of $200,000, compared with a loss of $700,000 in the 1983 quarter.

Westar Timber Ltd., a subsidiary of British Columbia Resources Investment Corp., reported a second-quarter 1984 loss of $1.7 million, down from earnings of $300,000 in the 1983 quarter. Extremely low lumber prices caused the company to close five of its six lumber mills late in the second quarter. Nevertheless, "the improved pulp picture has allowed Westar Timber to break even in June and it should be profitable for the balance of the year," said Bruce Howe, president and CEO of BC Resources.

British Columbia Forest Products Ltd. was able to raise sales 9.7%, to $262.7 million, due to improved market conditions for kraft pulp and newsprint. Earnings were $5.4 million, compared with a loss of $4.5 million in 1983.

"Operations for the third quarter are expected to be similar to the second quarter with contrasting market conditions for pulp and paper and wood products. No further downtime is expected for pulp or newsprint production, but some curtailments could occur in the face of the depressed market conditions for wood products," said president and CEO, Kenneth P. Benson, and chairman, Ian A. Barclay.

EXPANSION

Domtar to install new Trenton machine

Domtar Inc. plans to install a new corrugating medium machine in a C$35-million modernization of its Trenton, Ont., mill, the company announced.

The new machine will replace an existing 115-in.-trim machine and boost capacity of the mill from 195 metric tpd to 350 tpd. Initial production will be targeted at 280 tpd when the machine begins operation in early 1986. A purchase order for the new machine has not been signed, according to a company spokesman.

The mill's 136-tpd semichemical pulp line will also be modernized with a new evaporator plant, which will be part of a treatment facility to improve mill effluent and paper quality. Capability to recycle old corrugated boxes will be modernized and expanded to meet increased production.

Manville to upgrade two machines

Manville Forest Products Corp. has announced plans to spend $24 million over the next several months for modifications to its two coated kraft paperboard machines at West Monroe, La. The work will improve graphic reproduction quality of the board produced by the two machines and significantly improve productivity of the mill. Completion is scheduled for the spring of 1985.

Nos. 6 and 7 machines have a combined capacity of about 1,150 tpd of coated kraft board used for folding cartons and beverage carriers.

Georgia-Pacific will install uncoated free-sheet machine at Port Hudson mill

Georgia-Pacific Corp. will install a new 650-tpd uncoated free-sheet machine at its Port Hudson, La., market pulp mill, with startup scheduled for the third quarter of 1986. Preliminary engineering has been started. The new unit, plus related work, will cost G-P about $200 million.

In addition to bringing online a new paper machine, the company plans to increase the mill's bleached hardwood pulp capacity by about 35,000 tpy from its present 240,000-tpy level. The mill also has capacity to produce 210,000 tpy of bleached softwood kraft pulp.

Grades to be produced by the machine will include forms bond, offset, and other printing papers. G-P chairman, T. Marshall Hahn Jr., said that this decision "reflects two aspects of our corporate strategy: increasing the size of our paper business to balance our large building products business and the manufacture of higher-value-added products."

G-P thus becomes the latest in a long list of producers to install or plan new uncoated free-sheet machines. Six of the top ten producers in the U.S. uncoated free-sheet industry—Champion International Corp., International Paper Co., Hammermill Paper Co., Union Camp Corp., G-P, and Weyerhaeuser Co.—have started up a machine or conversion, have announced a machine, or have discussed a possible machine for the period 1983-89. Canada is also undergoing a massive capacity buildup, led by industry leaders Island Paper Mills, Great Lakes Forest Products Ltd. and Domtar Inc., with part of that output targeted for the U.S.

New coated free-sheet capacity at North American mills.

Company–U.S.	**Location**	**Capacity** (short tpy)	**Year**
Champion	Courtland, Ala.	150,000	1983
Crown Zellerbach	Camas, Wash.	160,000	1984
Georgia-Pacific[1]	Crossett, Ark.	100,000	1984
Westvaco[1]	Wickliffe, Ky.	35,000	1984
Union Camp	Eastover, S.C.	215,000	1984
International Paper[1]	Mobile, Ala.	350,000	1985
Georgia-Pacific[1]	Crossett, Ark.	50,000	1985
Georgia-Pacific	Port Hudson, La.	230,000	1986
Weyerhaeuser[2]	Columbus, Miss.	200,000	n.a.
Hammermill Paper[2]	Selma, Ala.	n.a.	n.a.
Company-Canada			
Island Paper Mills	New Westminster, B.C.	77,000	1983
Great Lakes Forest	Dryden, Ont.	135,000	1984
Domtar[3]	Windsor, Que.	176,000	1986
Domtar	Windsor, Que.	176,000	1989

North American capacities, 1984
U.S.: 9.554 million short tpy
Canada: 1.232 million short tpy

n.a. = Not available or not applicable.

[1] Machine conversion or modernization.

[2] Machine announced or discussed in principle but plans not finalized.

[3] During 1986-89 period Domtar will also be shutting down 97,000 tpy of old machines.

Source: *Pulp & Paper* estimates, American Paper Institute, Canadian Pulp & Paper Assn.

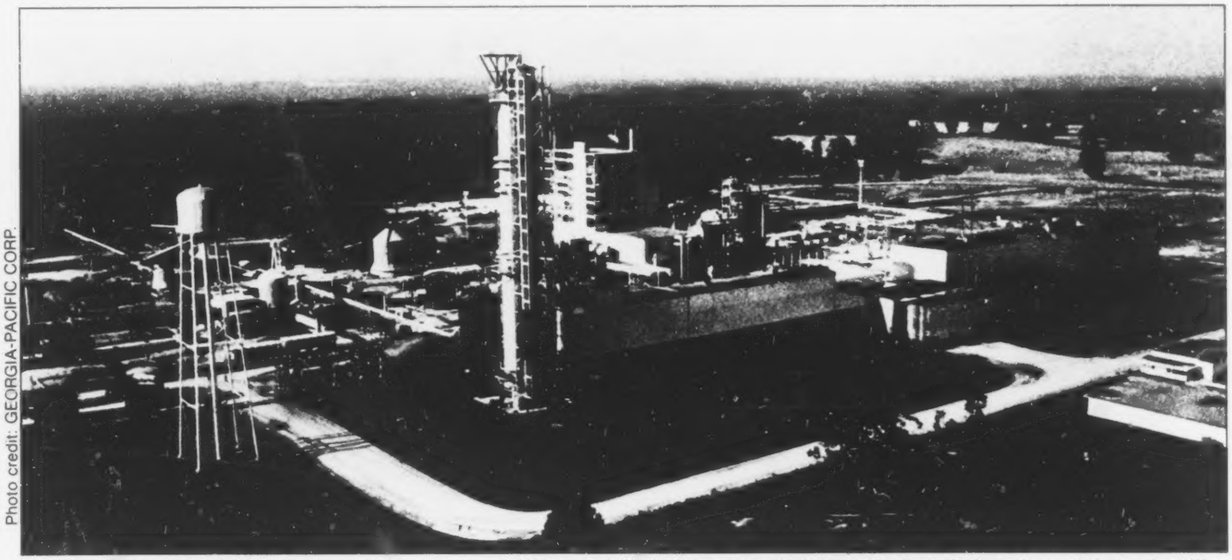


Photo credit: GEORGIA-PACIFIC CORP.

Georgia-Pacific's new 650-tpd uncoated free-sheet machine is scheduled to startup in 1986 at the Port Hudson, La., market pulp mill.

James River approves Naheola machine

James River Corp. recently approved a $120-million project which includes installation of a 70,000-tpy tissue machine at its Naheola, Ala., mill and expansion of pulp capacity by a similar amount (*P&P*, May, p. 33). The Beloit twin-wire machine will have a wire width of about 260 in. and a design speed of 6,000 fpm. It will produce lightweight tissue which will be converted into the company's two-ply Northern bathroom tissue. Converting facilities at the mill will be modernized and expanded. Completion is scheduled for mid-1986.

Naheola currently has four 192-in.-wide Beloit yankee fourdrinier tissue machines with a combined capacity of 160,000 tpy. The mill also has two bleached board machines with a total capacity of approximately 200,000 tpy. Two of the tissue machines and the largest bleached board machine were recently rebuilt. The rebuild of the 236-in.-wide No. 3 bleached board machine included new coating and calendering equipment for production of board suitable for rotogravure and multicolored lithography, the company said.

When the new tissue machine comes online, production on the existing four tissue machines will be shifted around so that the roughly 65%/35% balance between the company's consumer and commercial tissue does not significantly change. There has been concern about overexpansion in the commercial segment of the tissue market, with Fort Howard Paper Co. bringing on two new machines and Crown Zellerbach installing another.

Last week James River said that expenses connected with introduction of its premium branded towel and tissue products into northeast markets would "have a temporary, adverse effect on earnings." James River entered the northeast market last year and became a national producer through the purchase of Diamond International Corp.'s 60,000-tpy tissue mill at Old Town, Maine. The company has been reconfiguring the facility to meet its quality requirements and improve efficiency.

New tissue machines announced or proposed for the North American market.

Company	Mill location	Capacity (000 tpy)	Startup date
Scott Paper Ltd.	N. Westminster, B.C.	36	1984
Cascades Paper	Rockingham, N.C.	17	1984
Fort Howard	Green Bay, Wis.	88[1]	1984
Crown Zellerbach	S. Glens Falls, N.Y.	42	1985
Little Rapids	Potsdam, N.Y.	50[2]	1986
Fort Howard	Muskogee, Okla.	80[3]	1986
James River	Naheola, Ala.	70	1986
Proposed			
Wisconsin Tissue	Menasha, Wis.	n.a.	n.a.
Crown Zellerbach	Southern site (possibly Bogalusa, La.)	n.a.	n.a.
Tagsons Paper	Mechanicville, N.Y.	14	n.a.

n.a. = Not available

1. Undetermined amount of existing capacity at Green Bay will be shut down.
2. Idle tissue machine acquired from Kimberly Clark Corp.'s Kapuskasing, Ont., mill.
3. Estimated capacity.

The new product introductions in the Northeast and selected mid-Atlantic markets included extensive consumer testing and heavy television advertising and promotional activity. Brands involved included Northern bathroom tissue (the No. 2 selling domestic brand), and Northern Napkins and Brawny towels.

Meanwhile, James River has approved a $15-million project to double the capacity of the company's Iowa City, Iowa, release paper converting plant. The plant was one of two H.P. Smith Paper Co. plants purchased last year from Phillips Petroleum Co.

Consolidated approves LWC machine

Consolidated Papers Inc. won board approval to install a new coated groundwood paper machine "subject to obtaining environmental approvals and final engineering studies," a company announcement said.

A spokeswoman would not elaborate on the terse press release. Industry sources indicate the machine will be installed at the Biron Div. mill at Wisconsin Rapids, Wis., or the Stevens Point Div. at Stevens Point, Wis., with startup in 1987. It is expected to be about the same size as the 170,000-tpy lightweight coated machine St. Regis Corp. installed at Sartell, Minn., in 1982, and to produce about the same basis weights of No. 5 coated—lightweight paper, between 30 lb and 32 lb on the low end and 40 lb to 45 lb on the high end.

Fiber supply should not be a problem for the expansion since Consolidated announced July 19 it will not reopen its Newaygo Forest Products Ltd. sawmill in Mead, Ont., freeing up the 358,000 acres of timberland that has "been the chief source of raw material for the [saw]mill."

That sawmill was shut down in February by a strike, and the company decided to make the closure permanent when negotiations didn't progress. A company announcement commented that the timberland is "a valuable pulpwood resource that can serve the company well in the future."

Operating on a one-shift basis, the sawmill had capacity to produce 25 million bd ft of dimension lumber and 42,000 tpy of chips, which were consumed at the company's Appleton, Wis., sulfite pulp mill. When Appleton shut down in 1982, the chips went to the Wisconsin River Div. in Whiting, Wis. Now with no sawmill to supply, the company will presumably be able to make use of the balance of the Newaygo fiber to help out with the coated groundwood expansion.

Industry executives are beginning to worry about a possible glut of capacity in 1987, with Consolidated and Bowater having announced machines, and with machines under study—or believed to be under study—by International Paper Co. at Pine Bluff, Ark., Blandin Paper Co. at Grand Rapids, Minn., St. Regis (probably at Sartell), Kruger Inc. at Trois Rivières, Que. (just 70,000 tpy), and one other Canadian company, a market pulp producer. Also, Nitec Corp.'s 80,000-tpy mill in Niagara Falls, N.Y., is expected to reopen in the first quarter of 1985.

The coated paper market continues to astound observers with its health, however. Shipments of coated No. 5 were up 15% through May, one executive estimates, while No. 4 shot up by 28%.

MARKET REPORT

AFTER PULP MARKET'S DRAMATIC FIRST-HALF JUMP—WHAT'S NEXT?

Pulp prices rose by about $100/ton in the first half, but the British Columbia lockout was the major cause

■ The pulp market strengthened dramatically in the first half of 1984, with the price of benchmark northern bleached softwood kraft jumping from $440/metric ton ($450 in the U.S.) at the end of 1983 to $540 by the beginning of the second quarter. North American and Scandinavian producer inventories, which hovered around 1.5 to 1.6 million metric tons through most of 1983, had dropped to almost 900,000 tons by the end of March and were still at only 1.03 million tons at the end of June.

The dramatic turnaround, however, was due in large measure to the six-week British Columbia pulp mill lockout, which resulted in an estimated potential production loss of more than 600,000 tons. Now the question is: will pulp producers be able to hold prices close to current list levels and perhaps try for another price increase in the fourth quarter of 1984?

Shipments of Norscan chemical paper-grade pulp jumped an unprecedented 19% in 1983, but part of that went into customer inventories built up in anticipation of price increases and a possible strike. For the first half of this year, shipments were up only a modest 2.8% as customers worked down their inventories.

Shipments may show somewhat greater strength in the second half of this year as customers' orders more closely match actual consumption. But the pace of the U.S. economic recovery is cooling, and Europe is only expected to continue to show gradual economic growth.

CURRENCY GYRATIONS. Another problem for the pulp market in the second half is the continuing strength of the U.S. dollar over most world currencies. The strong dollar has the effect of making pulp more expensive for buyers in terms of their local currencies and has greatly improved the competitive position of Scandinavian (particularly Swedish) and nontraditional producers (Brazil).

During the summer lull in Europe, agents report more discounting and some easing in payment terms. One form the price cutting is taking is increased sales in producer (krona) or local currencies (D-mark, lira, franc) which translated into dollar terms would be considerably below current list.

There is also significant new market pulp capacity coming onstream in the second half of this year. In North America, Leaf River Forest Products will be starting up its 335,000-tpy bleached kraft softwood/hardwood mill at New Augusta, Miss., in September, while International Paper Co. will be bringing on 320,000 tpy of bleached softwood kraft at its reconfigured Georgetown, S.C., mill this fall. Westar Timber also recently reactivated the 135,000-tpy B Mill at its Prince Rupert, B.C., complex, which had been idle since late 1982.

In Europe, Soporcel (Soc. Portuguesa de Celulose) has started production at its new 300,000-tpy bleached kraft eucalyptus pulp mill in Portugal, while a 200,000-tpy bleached sulfite market pulp mill has come online in Paskov, Czechoslovakia. In addition, a 200,000-tpy kraft pulp mill is scheduled to start up later this year at Pöls, Austria.

FAVORABLE BALANCE. Beyond the current capacity bulge, however, the supply/demand balance for chemical paper-grade market pulp looks favorable. Norscan capacity is forecast to rise only 4% over the entire 1983-86 period to 18.6 million tons, with the most growth in the U.S. and a slight capacity decline in Scandinavia due to forward integration into higher value added paper production.

The poor profit performance for market pulp in recent years may also be causing some forward integration in the U.S. Georgia-Pacific Corp. recently approved a new uncoated free-sheet machine for its Port Hudson, La., mill and Hammermill Paper Co. and Champion International Corp. are also considering machines at market pulp mills. Such projects would pull a significant amount of pulp from the market in a few years.

The Norscan producers statistical committee has estimated chemical paper-grade market pulp shipments will rise 4.5% in 1984 to 16.6 million tons and then remain level in 1985. This would result in shipments-to-capacity ratios of 93.3% in 1984 and 91.0% in 1985—up from 89.5% in 1983 and 75.6% in 1982.

Such operating rates would enable producers to push through some further price increases, especially if there was any weakening in the U.S. dollar. Data Resources Inc. is projecting an average NBSK price for 1986 of $700/ton, up from the present level of $540. Somewhat more pessimistic is Vancouver newsletter publisher Ross Hay-Roe, who says "pulp prices are not likley to exceed $650 in this cycle—say by late 1985." ■

—Will Mies, Executive News Editor

TABLE 1: **Estimated North American and Scandinavian capacity, potential production and demand (000 metric tons).**

	1982	1983	1984	1985
Capacity	17,640	17,770	17,815	18,255
Potential production[1]	16,760	16,880	16,340[2]	17,340
Demand	13,335	15,905	16,620	16,610
Demand/capacity	76%	90%	93%	91%
Demand/potential production	80%	94%	102%	96%

1. Potential production = 95% of capacity.
2. Partially adjusted for British Columbia strike production loss.
Source: American Paper Institute.

TABLE 2: **Estimated 1984 average costs for producing bleached kraft market pulp at existing mill ($/a.d. metric ton).**

	Softwood			**Hardwood**
	Western Canada	**Sweden**	**U.S. South**	**Brazil**
Fiber	$109	$184	$120	$55
Chemicals	41	31	50	20
Energy	36	12	45	15
Wages/salaries	49	35	60	27
Other	42	27	60	40
Total[1]	**277**	**289**	**335**	**157**

1. Excluding interest, depreciation and delivery costs.
Source: Fred Robertson, Mead Pulp Sales Inc.

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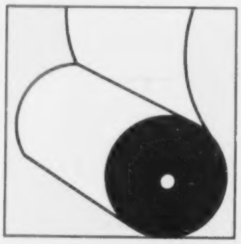

MARKET REPORT

STRONG BOX DEMAND BOOSTS RECOVERY IN CONTAINERBOARD

Moderate capacity expansion makes outlook bright for 1985—if economy sustains growth, even at slower rate

■ Corrugated container shipments have begun to drop off from their superheated pace earlier this year, reflecting a general slowing in the U.S. economic growth to a more sustainable pace. Box shipments in June were only 1.7% ahead of a year ago compared with a 9.1% rise for the entire first half, according to the Fibre Box Assn.

The slowing probably reflects some reduction of packaged goods inventories built up in distribution channels throughout the economy earlier this year. Once this is accomplished, box shipments will probably pick up this fall and more closely match actual consumption. Most analysts look for about a 7% jump in box shipments for all of this year.

RISING PRICES. This is good news for containerboard producers whose operating rates this year are likely to average about 96% to 97% vs about 91% last year and about 84% in 1982. Containerboard prices have been rising from their recession lows, with 42-lb linerboard up from a low of $250/short ton in late 1982 and early 1983 to $320/ton by February 1984 and with producers trying for a $30/ton hike in late summer. (Semichemical medium prices for 26 lb are $10/ton lower.)

The only weak area this year has been in U.S. linerboard exports, where the strong U.S. dollar has held back prices and made U.S. producers less competitive. Lower mill net on export sales has diverted home some tonnage, adding to domestic supply. U.S. export shipments in the first half were down 10% from a year ago.

Depressed prices during the recession caused most producers to run in the red, with the break-even price for an average linerboard mill estimated at about $280 to $290/ton. Heavy financial losses suffered by the industry in 1982-83 have discouraged new capacity expansion. Linerboard capacity is expected to rise at only a 1.8% annual rate over the 1984-86 period and semichemical medium at an even slower pace.

Actual growth in liner capacity, however, could turn out to be somewhat faster due to installation of new high-pressure loading presses, such as the Extended Nip, and the swing of some machines from kraft paper. Kraft paper has been under competitive pressure from plastic film, particularly in the grocery sack market where some forecasters say plastic bags could capture 25% of the market over the next few years.

LIMITED EXPANSION. The rate of corrugating medium capacity expansion is somewhat more predictable. However, reactivation of some less-efficient machines closed in the recession (Packaging Corp. of America, Filer City, Mich.; and Manville Forest Products, West Monroe, La.) may cause faster-than-expected growth.

Only one new kraft linerboard machine has been announced, a new 315,000-tpy machine at Chesapeake Corp.'s West Point, Va., mill for startup in late 1985. Owens-Illinois has been studying a new semichemical medium machine at its Tomahawk, Wis., mill to replace an existing machine which would result in about a 247,000-tpy capacity gain if approved. The only other machine that has been announced is at Temple-Inland Inc.'s new 175,000-tpy recycled linerboard mill east of Los Angeles (see interview p. 186).

Assuming slower 2.5% to 3% economic growth next year, operating rates for linerboard and semichemical medium are likely to reach 98% to 99%, according to most forecasters. Analyst Thomas P. Clephane of Morgan Stanley & Co., however, now looks for only one linerboard price hike in 1985 (in March), resulting in an average price of $375 next year vs $328 this year.

The improvement in pricing levels should result in a major recovery in profitability. But the roller coaster performance of the unbleached kraft segment in recent years plus the attractiveness of buying rather than building additional capacity is causing a major reshuffling of assets. Some companies are opting out of the brown fiber business and divesting their mills, while others are increasing their commitment.

Stone Container Corp., for example, doubled in size by acquiring Continental Forest Industries' unbleached kraft mills and related converting operations last year, and Georgia-Pacific Corp. recently completed the purchase of St. Regis Corp.'s Monticello, Miss., linerboard mill and U.S. box plants.

Jefferson Smurfit Ltd. several years ago completed the takeover of Alton Packaging Corp. and recently made an unsuccessful bid for Southwest Forest Industries. And there is speculation that Champion International Corp., a firm more enamored with the white paper side of the business, will sell off some more of St. Regis's containerboard or kraft paper assets once its takeover of St. Regis is complete. Where it will end nobody knows, but the industry will certainly have a different shape. ■

— *Will Mies, Executive News Editor*

(Many of the issues mentioned above will be covered in P&P's "First International Unbleached Kraft Conference," Nov. 12-13, 1984, at the Vista International Hotel in New York, N.Y. For information, call or telex: Pulp & Paper, Symposium Dept., 370 Lexington Ave., New York, N.Y. 10017. Telephone (212) 683-9294; Telex 220442.)

TABLE 1: **U.S. containerboard industry forecast.**

	1982	1983	1984e
Box shipments			
(billion ft²)	235.2	252.5	270.2
% change	−4.5%	+7.4%	+7.0%
Linerboard			
(000 tons)			
Production	13,494	15,001	15,950
Exports	1,819	2,094	1,900
Capacity[1]	16,032	16,266	16,430
Utilization rate (%)	84.2%	92.2%	97.1%
Average price (42-lb)	$269	$273	$328
Corrugating medium			
(000 tons)			
Semichemical	4,389	4,731	5,025
Recycled	1,156	1,302	1,430
Total	5,545	6,033	6,455
Capacity[1]			
Semichemical	5,207	5,156	5,218
Recycled	1,478	1,555	1,582
Utilization rates (%)			
Semichemical	84.3%	91.8%	96.3%
Recycled	78.2%	83.7%	90.4%
Average price (26-lb semichemical)	$259	$263	$318

1. Based on 1983 American Paper Institute capacity survey figures. Source: API, Dept. of Commerce (exports), *Pulp & Paper Price-Book.*

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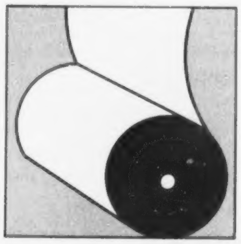


MARKET REPORT

UNCOATED FREE SHEET WEAKENS AFTER STELLAR PERFORMANCE

Bulge of new capacity, inexpensive imports, and high inventories cause concern about 1984-85 outlook

■ In the wake of a failed attempt to raise third-quarter prices, uncoated free-sheet mills have begun taking stock of the industry's outlook for the rest of the year—and there seems to be little reason for celebration. A healthy fourth quarter is expected after a soft summer, but no return to the tightness of late last year is thought likely.

That picture seems confounded by industry statistics, say industry analysts. Operating rates through May were averaging 95.1% and for the month of May were a respectable 94.1%, according to one executive's estimate. But backlogs and operating rates began dropping after that, he added, and July, at least, seemed likely to be a worse month than July 1983.

Darkening the picture also was the profusion of offers from foreign mills of imported paper, priced several points below the market in the case of some continental European and Finnish paper and 15% to 20% off for Brazilian paper. For the first five months of the year, U.S. customers had imported 184,000 short tons of uncoated free sheet, representing the equivalent about 6.7 days of production by the U.S. industry. For the same period last year, imports were just 52,000 tons, despite frequent complaints of unreliable delivery timing and quality from imported paper, particularly Latin American paper.

TABLE 1: **Uncoated free-sheet shipments to major end users, first five months of 1984 (000 short tons).**

End-use	Tons(e)	% change from Jan.-May 1983
Book publishing	210	20%
Business forms	965	10
Commercial printing	990	13
Copy paper	720	4.5
Envelopes	445	16.5
Stationery and tablet	130	−30

e = Estimate.
Source: *Pulp & Paper estimates.*

IMPORTS HURT PRICING. While imports were becoming an important factor in tonnage terms, they also hurt the U.S. industry in pricing. The July 1 uncoated free-sheet price hikes that were abandoned by producers of forms bond and offset papers would have undoubtedly had at least a slightly better chance if 15-lb Brazilian forms bond were not readily available at $680/ton, compared with a U.S. market average of $795.

A more important factor, however, was the presence of significant inventories of forms bond and cut-size, and the imminence of traditionally slow summer demand. Most observers believe July was simply a bad time to try a price increase, and some think the fourth quarter may work better.

Not all feel that is the case, however. Some producers and consumers bet that a price hike won't stick before Jan. 1, although they concede that the robust U.S. economy could surprise everybody with a continuation of rapid first-half gross national product growth rates.

Business hasn't been at all bad for uncoated free-sheet mills this year. Through May, one executive estimates, while overall shipments of uncoated free sheet were 8.1% ahead of the first five months of last year, forms bond was 13.3% ahead and carbonless was up 12.8%. Offset rolls were 12% ahead of the year-earlier pace and offset sheets rose by just over 12%. White envelope stock was booming, with an increase of 18.5%.

The difficulty of interpreting those data was shown, however, by the fact that he estimates tablet stock shipments plummeted by 34% through May and bond and writing totals were up only 2.9%. Some of the drop in tablet may have been influenced by imports of converted tablets from Brazil, but much may also be caused by a statistical aberration since some machines make tablet, envelope, forms bond and offset interchangeably.

FALLING ORDER BACKLOGS. The overall picture is a very healthy one. But another executive believes order backlogs industry-wide fell by two days, to just 15 days, between mid-June and early July. At the end of 1983, by contrast, backlogs were at 22 days.

He also points out that business sometimes shifts between grades. For example, while forms bond shipments rose 13% through May, he estimates shipments of uncoated free sheet to forms converters were up just 10%.

Also, while the forms business seemed to be growing in the double digits—even if barely—the groundwood forms sector was flat or expanding just marginally. U.S. shipments of groundwood forms were virtually unchanged, but Canadian shipments are believed to be up.

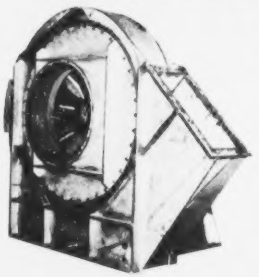
But one customer said groundwood forms have not yet recovered from the price situation of 1982-83, when free-sheet forms prices on the spot market actually dipped below groundwood forms for a time. That brought some groundwood customers back to free sheet even though free-sheet prices have rebounded since then, he said—and groundwood mills will have to work hard to win that business back.

Meanwhile, industry executives were worrying about an apparent bulge in capacity that is now beginning to appear. With Union Camp Corp.'s 215,000-tpy Eastover, S.C., mill now starting up, all eyes were focused on how that company would fit into the market situation.

But Eastover is by no means the only new capacity online between 1984 and 1986. Other additions this year include Crown Zellerbach Corp.'s new 160,000-tpy machine at Camas, Wash., conversions at Georgia-Pacific Corp.'s Crossett, Ark., mill, adding 100,000 tpy, and improvements at Westvaco Corp.'s Wickliffe, Ky., mill, adding 40,000 tpy. Then next year International Paper Co. will add 350,000 tpy through conversions at its Mobile, Ala., mill and G-P will add 50,000 tpy the same way at Crossett. Finally, in 1986, G-P will start up a 140,000-tpy machine at Port Hudson, La.

Ignoring machine shutdowns, those upgrades and startups total more than 1 million tons of new capacity—a huge lump for the market to digest in two years. And that doesn't even count rebuilds at IP's Georgetown, S.C., mill and a new machine at Champion International Corp.'s Courtland, Ala., mill in 1983. ■

—David R. Allan, Associate Editor



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Soda ash production increasing as exports soar

By BARRY SHOCKETT

U.S. soda ash production reached the 8.5-million-ton level in 1983, mainly because exports were up more than 47%. Export growth has continued in 1984, with 458,000 tons being reported by the end of March.

In 1983, the Anti-Dumping Tribunal ruled that all trona exported to eastern Canada was subject to antidumping duties. Kerr-McGee withdrew from that market in November.

U.S. statistics, sodium carbonate (000 short tons)

	1980	1981	1982	1983e
Capacity	9,620	10,360	10,540	11,360
Production	8,275	8,281	7,819	8,467
Imports	18.3	11.8	18	20
Exports	1,094	1,050.5	1,108.5	1,636
Apparent consumption[1]	7,131.5	7,146.5	6,667	6,868
Glass[2]	3,780	3,790	3,538.5	3,450
Chemicals	1,426.5	1,420	1,300	1,400
Pulping	250	250	223.5	200
Other[3]	1,675	1,718	1,605	1,818

1. Includes inventory adjustments. e = Estimated.
2. Including containers, sheet, and fibers.
3. Including water treatment, detergents, and miscellaneous.

Sources: U.S. Bureau of Mines, Bureau of Census, U.S. Dept. of Commerce.

Canadian statistics, sodium carbonate (000 short tons)

	1980	1981	1982	1983e
Capacity	441	441	441	441
Production	423	419	419	424.5
Imports	178	153	134.5	139
Exports	18	11.8	18	20
Apparent consumption[1]	566	589	530	549.5
Glass, including fibers	346	361.5	321.5	337.5
Chemicals	87	89	88.5	90.5
Pulping	18.5	22.5	21	22.5
Miscellaneous[2]	114.5	116	99	99

1. Includes inventory changes. e = Estimated.
2. Including mining, smelting, detergents, cleaners, and water treatment.

SODIUM CARBONATE

UNITED STATES

Uses: The primary use of soda ash in the pulp and paper industry is in sulfite liquor preparation. Kraft mills also employ sodium carbonate for makeup liquor. The largest application is in the glass industry, followed by chemical manufacturing, detergents, and water treatment.

Demand: Pulp mill soda demand last year dropped to about 200,000 tons, off 10.5% from the 223,500-ton consumption estimated in 1982. Glass industry use was also down in 1983 to about 3.45 million tons from 3.54 million tons in 1982. Total demand was 6.9 million tons, compared with 6.7 million tons in 1982.

Sources: The six U.S. natural soda ash producers are Allied Chemical, FMC, Stauffer Chemical, Tenneco, and Texasgulf in Wyoming, while Kerr-McGee mines its trona in California. Allied operates the sole synthetic plant (Solvay Process) at Syracuse, N.Y.

Availability: Despite the big jump in soda ash exports last year, the increase in capacity to more than 11 million tpy ensures sufficient soda ash supply for several years. 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: Unchanged since November 1982, the list for natural soda ash was boosted $6/ton to the $90/ton level on July 1. However, an $11/ton TVA has been in effect since late February—a $4/ton reduction from the $15/ton discount introduced last October. Synthetic sodium carbonate is still being listed at $132/ton. Price history: natural, 1983, $84/ton, f.o.b. Green River; 1982, $84-$92/ton; 1981, $86-$92/ton; 1980, $76-$86/ton; 1979, $61-$66/ton. Price history: synthetic, 1983, $132/ton, f.o.b. Syracuse, N.Y.; 1982, $132/ton; 1981, $126-$132/ton; 1980, $113-$123/ton; 1979, $96-$101/ton.

Forecast: Pulp mill usage of soda ash in 1984 is predicted to increase by about 10,000 tons. The continued improvement in exports (a 12% boost is expected in 1984) may result in more price firming in the second half of the year, either by reduced discounting or another list-price hike.

CANADA

Uses: Sulfite mills use sodium carbonate to prepare cooking liquor while kraft mills employ it to supplement caustic in their makeup liquor. Other end uses include glass, chemicals, mining, detergents, and water treatment.

Demand: In 1983, pulp mill usage of soda ash returned to the 1981 level of 22,500 tons, an estimated 7% increase over 1982. All end-use areas experienced increased consumption, but only chemical manufacturing's usage exceeded the peak year of 1981.

Sources: Allied Chemical is the sole domestic producer, and it makes synthetic ash in Ontario. It supplies its customers in western Canada with trona imported from its parent company in the U.S.

Availability: Canadian demand surpasses capacity but U.S. imports make up the shortfall. 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: Price firming south of the border was reflected in a boost in domestic list prices by about $5.50/ton to $188.70/ton, effective July 15. The $183/ton price tag had been in effect since July 1981. Price history: 1983, $183/ton, bulk, f.o.b. Amherstburg; 1982, $183/ton; 1981, $168-$183/ton; 1980, $145-$160/ton; 1979, $108-$128/ton.

Forecast: No further price hikes are expected for the balance of 1984. Pulp mill usage is predicted to increase by about 3,500 tons in 1984, but the mills expect to remain at the 26,000-ton level for at least the next four years.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.

PULP & PAPER

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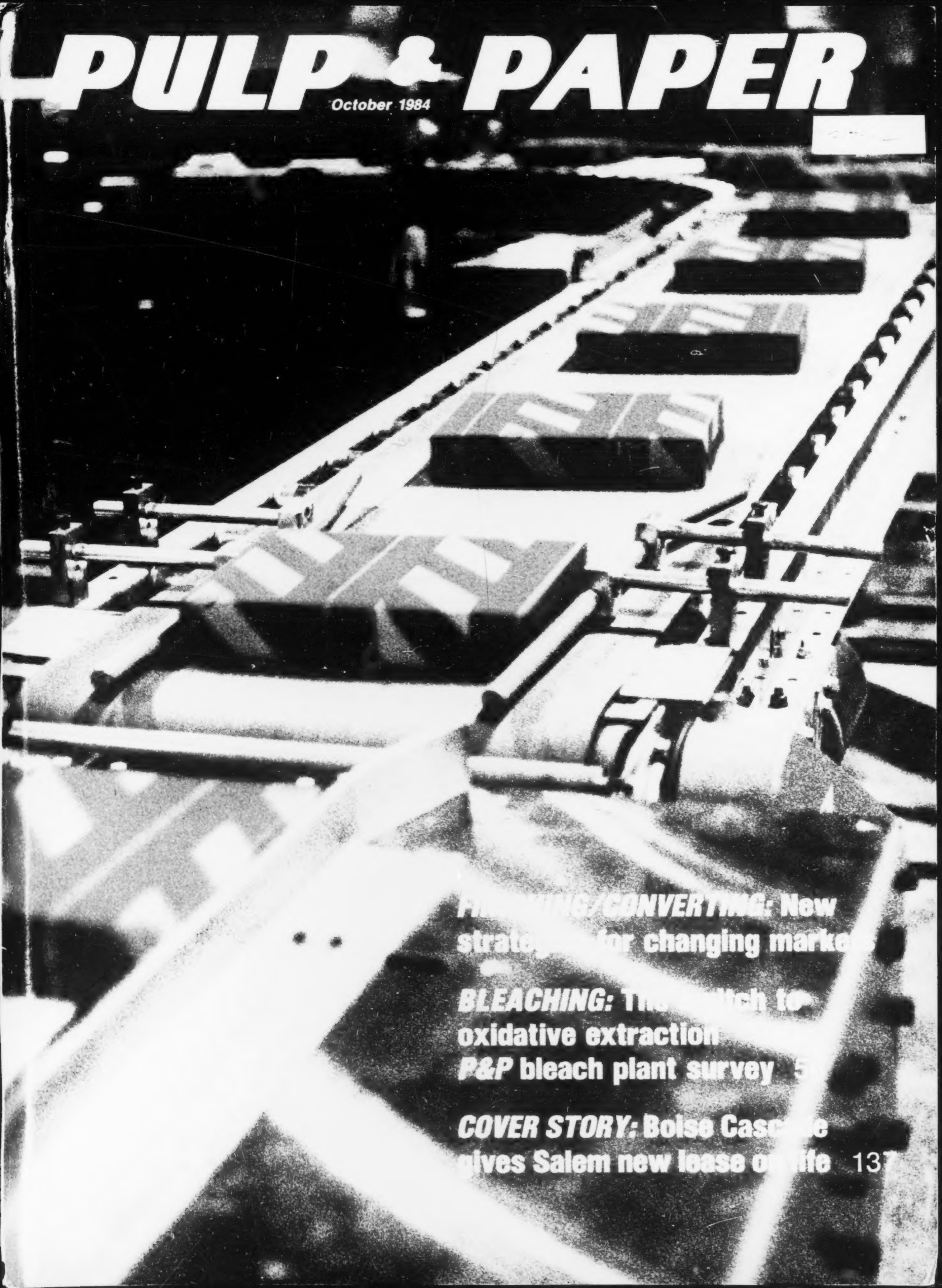

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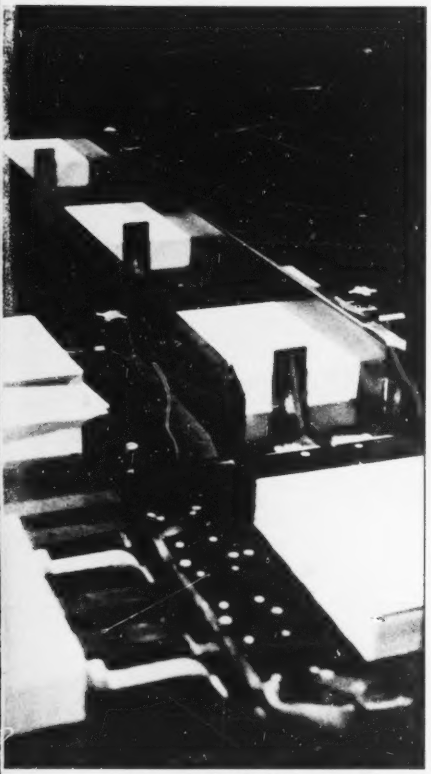

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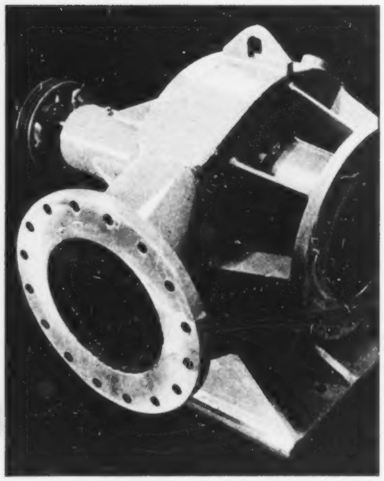

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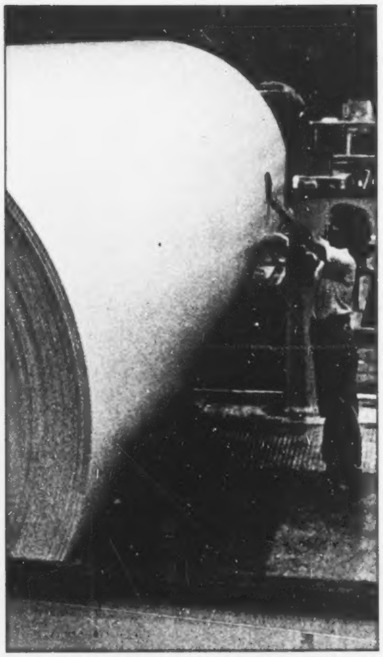

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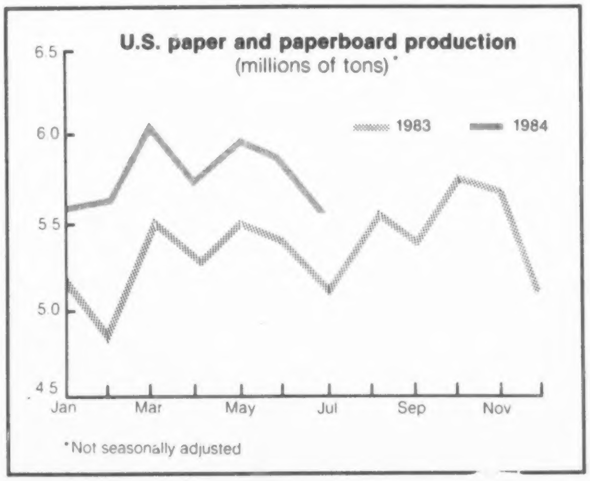
MONTH IN STATISTICS

U.S. paper and paperboard production seasonally adjusted rates moved to new highs as producers experienced less than normal downtime during the July vacation, maintenance and repair period, according to the American Paper Institute. The June-July two-month average of seasonally adjusted data showed paper and paperboard production at a rate of 69.4 million tpy. The rate for all grades was 6.5% above the average rate of all of 1983 and 7.8% ahead of the same period last year.

Among major grades, demand for printing/writing papers in most major markets was at record-high levels. Demand for the packaging grades of paper has also showed unusual strength so far this year as packaging and industrial grades rose 13% over last year's January to July period.

Canadian newsprint shipments totaled 759,000 metric tons in July, up 11.7% from July 1983, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates stood at 98% in July compared with 80% last year.



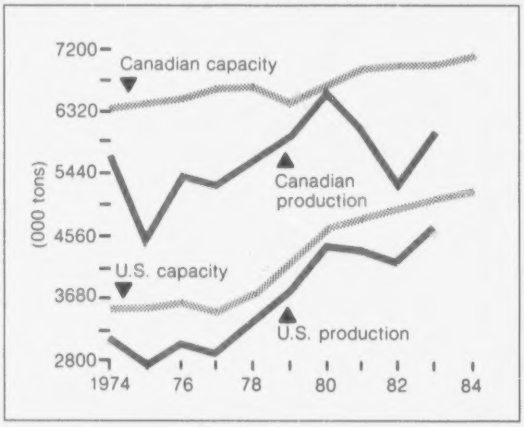
	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	July	451	8.2	5578	9.3
Uncoated groundwood (s)	July	127	4.1	1591	7.6
Coated paper (s)	July	478	4.8	6187	14.5
Uncoated free sheet (s)	July	707	6.5	9230	7.3
Unbleached kraft packaging and industrial (s)	July	328	15.1	3932	6.6
Tissue	July	401	8.4	4865	2.8
Total paper	**July**	**2762**	**8.3**	**34843**	**8.4**
Kraft linerboard, unbleached	July	1294	7.9	16153	9.7
Semichemical medium	July	436	13.0	5201	12.2
Bleached paperboard	July	344	12.4	4117	5.0
Recycled paperboard	July	606	8.0	8075	11.2
Total paperboard	**July**	**2780**	**8.9**	**34745**	**9.6**
Total paper and paperboard[5]	**July**	**5543**	**8.6**	**69588**	**9.0**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	June	4692	6.9	56186	7.8
Market pulp production	June	554	1.3	6787	4.8
Wastepaper consumption at paper/board mills	June	1294	7.4	15998	11.0
Pulpwood consumption (cords)	June	7264	1.1	88374	4.0
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	July	21.257	8.5	26.736[6]	9.0
Containerboard inventories at box plants	June	2659	5.9		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	June	1004	20.1	10728	24.4
Imports of Canadian newsprint	June	716	10.2	7471[6]	11.2
U.S. paper exports (including products)	June	425	8.1	4564	0.2
Exports of unbleached kraft linerboard	June	176	−5.7	2093	−10.6
Exports of woodpulp	June	307	−5.5	3685	1.4
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	July	759	11.7	5200[6]	9.4
Operating rates	July	98%	80%	91%	83%
Inventories held by U.S. consumers	July	905	1.2		
Woodpulp shipments (export only)	July	579	7.4	3745[6]	0.6
Operating rates	July	94%	90%	83%	84%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Paper-grade chemical market pulp: Recovery should continue

Statistics:	**1982**	**1983**	**1984e**
United States			
Production, 000 metric tons	4,213	4,694	4,970
Annual capacity, 000 tons	4,961	5,085	5,133
Utilization rate, %	84.9	92.3	96.8
Apparent U.S. consumption, 000 tons	3,972	4,672	5,140
Imports, 000 tons	1,998	2,448	2,750
Exports, 000 tons	2,239	2,470	2,580
Canada			
Production, 000 metric tons	5,284	6,071	6,200
Annual capacity, 000 tons	6,840	7,022	7,094
Utilization rate, %	77.3	86.5	87.4

e = Estimated.



Estimated capacities of major companies are*:

	Annual capacity (000 metric tons)	**Capacity share** (%)
1. Weyerhaeuser^{1,2,3,5,6}	900	7.3
2. Georgia-Pacific^{1,2,5}	700	5.7
3. International Paper^{1,2,6**}	620†	5.1
4. Parsons & Whittemore^{1,2}	580	4.7
5. Great Lakes Forest Products^{1,2,3}	575	4.7
6. Westar Timber^{1,3}	570	4.7
7. Canadian Forest Producst^{1,3,4}	565	4.6
8. B.C. Forest Products^{1,3,4}	480	3.9
9. MacMillan Bloedel^{1,3,4}	460	3.8
10. Leaf River Forest Products^{1,2,3}	410	3.4
11. Northwood Pulp & Timber^{1}	370	3.0
12. ITT Rayonier^{1,5,6**}	345	2.8

North American capacity (1984): 12.227 million tons
Capacity share of top five companies: 27.6%
Capacity share of top ten companies: 47.9%

*Several companies with major holdings in the market pulp sector are not shown above to avoid double counting of capacity: Noranda, 610,000 tpy (49% of MB, 50% of Northwood, 100% of Maclaren, 63% of Fraser); Canadian Pacific, 600,000 (54% of Great Lakes, 100% of CIP); and Mead 480,000 tpy (50% of Northwood, 50% of Brunswick, and 28% of BCFP).

**Exact capacity difficult to estimate because some of company's mills also make dissolving pulp.

†Includes new Georgetown, S.C., pulp line (net of production shifted at Texarkana, Texas).

1. Bleached softwood kraft; 2. Hardwood kraft; 3. Semibleached softwood kraft; 4. Unbleached kraft; 5. Bleached hardwood kraft; 6. Fluff pulp.

GRADE STRUCTURE: Paper-grade chemical market pulp is sold in the open market and does not include captive pulp used onsite or shipped to affiliated mills within North America. Pulp is divided into grades based on whether it is made from softwood or hardwood, manufactured by the sulfate (kraft) or sulfite pulping processes, and whether it is bleached, semibleached or unbleached. Northern bleached softwood kraft (NBSK) is the premium grade because of its long fiber length and strength, although papermakers have been making more use of southern pine and hardwoods. Market pulp is sold in sheets, flash-dried bales, or rolls. Some paper pulp also goes into nonpaper uses.

PRODUCTION/CAPACITY: In 1983, North American paper-grade chemical market pulp production jumped 13.4% to 10.8 million metric tons helped by strong U.S. white paper production and some customer inventory building. Canadian production was up 14.8%; U.S. output jumped 11.4%.

U.S. production in 1984 is expected to rise another 6% to 4.97 million tons while Canadian output increases 2% to 6.2 million tons. The larger increase in the U.S. and the smaller rise in Canada reflect the impact of the six-week British Columbia labor dispute earlier this year, which resulted in the loss of more than 600,000 tons of potential production.

Producer inventories at North American and Scandinavian (Norscan) market pulp mills remained fairly stable at between 1.5 to 1.6 million tons through most of last year but dropped to almost 900,000 tons in February as customers built up stocks during the labor dispute. Producer stocks have since climbed to 1.2 million tons as of the end of July.

PRICING: Pulp prices rose dramatically this year thanks to strong white paper output and the British Columbia labor dispute. After firming only slightly last year, the price of NBSK in the U.S. jumped about $100/ton in two consecutive quarterly increases to $540/metric ton on Apr. 1. But the return of British Columbian mills to full production, rising inventory levels, and the strong U.S. dollar have caused some discounting from the list levels. Skepticism existed over whether producers would be able to push through another price hike this year without a strong comeback in U.S. and European white paper output and weakening in the dollar.

Another factor that may make a price hike difficult this year is a bulge of new capacity coming online, including Leaf River Forest Products' 335,000-tpy bleached kraft pulp mill in New Augusta, Miss., and a 320,000-tpy pulp line at International Paper's reconfigured Georgetown, S.C., mill. Several new mills were also scheduled to start up in Europe.

Beyond the current bulge, Norscan capacity is expected to rise only 4% between 1983-86. Pulp prices will probably show a gradual rise through 1985 and perhaps into 1986 with NBSK peaking at $650 to $700/ton by some forecasts.

Year-end U.S. market pulp prices in $/metric ton NBSK: 1976, $410; 1977, $342; 1978, $375; 1979, $460; 1980, $530; 1981, $530/$565; 1982, $440; 1983, $450; 1984 mid-year, $540—some discounting. (See *P&P PriceBook* for details.)

(News section continues on page 23)

WORLD CAPACITY

FAO capacity survey shows growth

Worldwide paper-grade pulp capacity in 1983 was 153.2 million metric tpy with woodpulp accounting for 144.0 million tons or 94% and other fiber pulps adding 9.2 million ton. Pulp capacity is expected to rise to 165.4 million tons in 1988, an annual growth rate of 1.5%, reports the United Nation's Food & Agriculture Organization in its "FAO Pulp & Paper Capacities 1983-1988."

Paper and paperboard capacity rose 0.7%, compared with a 1.4% increase in 1982. Capacity in 1983 was 206 million tpy and is expected to increase to 224 million tons by 1988, an average growth of 1.7% per year.

Pulp. Chemical grades represent 64% of total pulp for papermaking, a percentage they have held for some years and at which they are expected to remain.

The main growth continues to be in thermomechanical pulp. World capacity in 1983 was 9.38 million tpy, and estimated expansion to 1988 is 3.1 million tons, a 33% rise. The "developed market economies" have 96% of 1983 capacity, and 54% of this is in North America. Furthermore, Canada and the U.S. account for more than half the estimated growth in world TMP capacity: by 1988, 54% of the world's capacity is expected to be located in these two countries. India introduced TMP capacity in 1983.

Mechanical pulp capacity continues to fall off with a reduction of 0.75 million tons during 1983. The largest reductions were in Canada, West Germany and Sweden.

Market pulp production capacity in 1983 was estimated at 29.3 million tpy in 1983, with an indicated increase of 5% to 31 million tons by 1986. A small decrease is estimated for Finland which should be offset by increases for Sweden and Norway. Regional distribution in 1983 was 12.5 million tons in North America, 6.4 million tons in Nordic countries, 3.0 million tons in the rest of Europe, 2.0 million tons in the U.S.S.R., 2.2 million tons in Latin America, 0.7 million tons in Oceania, and 0.5 million tons in Africa.

Paper grades. World capacity for paper and paperboard in 1983, reports FAO, was 205.9 million tons. This is estimated to increase by 18 million tons to a total of 224 million tons in 1988, an annual growth rate of 1.7%.

World newsprint capacity in 1983 of 30.7 million tons constitutes 15% of world paper and paperboard capacity. Estimated growth of 2.7 million tons for newsprint in the 1983-88 period will be at 1.7% per year (about half the 3.1% per year rate of 1978-83).

Printing/writing paper capacity in 1983 was 51.3 million tons and is estimated to reach 57.4 million tons by 1988 which is an annual rate of 2.4%.

Capacity for other paper and board grades in 1983 was 123.8 million tons. Capacity in 1988 is estimated to be 133.1 million tons, an expected growth rate of 1.5% over the five years.

A continuing reduction in the ratio between pulp and paper capacity is reported in the FAO survey. In 1969, pulp capacity was 81.5% of papermaking capacity. In 1979 the ratio had declined to 77.1%, and in 1983 it had dropped to 74.4%. A further decline in the apparent ratio of paper pulp to paper to 73.8% during 1988 is forecasted .

World pulp, paper and paperboard capacity, 1973-88
(million metric tons)

	1973	1978	1983	1988
Total woodpulp, paper grades	119.8	134.9	144.0	154.8
Mechanical[1]	28.9	32.6	35.5	38.5
Semichemical[2]	9.9	10.5	9.6	10.1
Chemical	81.1	91.9	98.6	105.8
Other fiber pulp	8.2	10.4	9.2	10.6
Dissolving pulp	5.9	6.1	6.1	6.3
Total paper and paperboard	160.7	187.6	205.9	224.1
Newsprint	24.7	26.4	30.8	33.5
Printing and writing	35.7	42.8	51.3	57.4
Other paper and paperboard	100.3	118.4	123.8	133.1

1. Including thermomechanical pulp.
2. Including chemigroundwood.

Capacity increases to 1988: world paper woodpulp

	Capacity (000 metric tons)		Average annual increase (%)	
	1983	1988	1978-83	1983-88
World total	144,007	154,773	1.3%	1.5%
Market economies	118,426	126,545	0.9	1.3
Northern America	72,749	76,415	1.7	1.0
Japan	12,006	12,158	−0.1	0.3
Western Europe	30,518	33,689	−0.6	2.0
Oceania	2,326	2,670	2.2	2.8
Others	827	1,613	3.9	14.3
Market economies	8,415	10,450	7.3	4.4
Africa	724	815	15.4	2.4
Latin America	5,800	7,113	5.6	4.2
Asia	1,891	2,522	10.7	5.9
Centrally planned economies	17,166	17,778	1.7	0.7
Asia	1,167	1,282	−13.8	1.9
Eastern Europe	4,354	4,446	3.5	0.4
U.S.S.R.	11,645	12,050	3.8	0.7

Capacity increases to 1988: world paper and paperboard

	Capacity (000 metric tons)		Average annual increase (%)	
	1983	1988	1978-83	1983-88
World total	205,933	224,079	1.9%	1.7%
Market economies	161,377	174,338	1.7	1.6
Northern America	81,219	85,200	1.9	1.0
Japan	23,198	24,908	1.9	1.4
Western Europe	52,770	59,148	1.1	2.3
Oceania	2,509	2,807	1.8	2.3
Others	1,681	2,275	6.6	6.2
Market economies	18,783	22,583	6.6	3.8
Africa	924	1,115	5.4	3.8
Latin America	10,240	12,659	5.3	4.3
Asia	7,619	8,809	8.8	2.9
Centrally planned economies	25,773	27,158	0.1	1.1
Asia	5,837	6,284	−7.7	1.5
Eastern Europe	6,436	6,874	1.8	1.3
U.S.S.R.	13,500	14,000	4.2	0.7

Wide acceptance of new bleaching

P&P's latest exclusive survey of U.S. bleach plant operations finds higher use of cheaper chemicals and better equipment to reduce costs

By MICHAEL J. DUCEY, Technical Editor

■ Last year, *Pulp & Paper* presented a comprehensive summary of the latest technology in bleach plant operations (see Nov. 1983, p. 53). That report also included summarized data for the average chemical usage of producers by grade, sequence, species, capacity, number of towers and geographical location. This year a follow-up survey was conducted to determine the general acceptance of the newly available equipment and the benefits of this equipment.

Table 1 represents a breakdown of the fully bleached chemical pulp producers surveyed. According to the latest American Paper Institute capacity reports, 22.4 million tons of bleached pulp are produced annually (the United Nations' Food & Agriculture Organization's estimates are closer to 21 million) in the U.S. *P&P* surveyed producers of more than 16 million tons, or close to 70% of the total. Three-quarters of those producers provided detailed operating data, and all producers supplied details of their sequence modification plans. Therefore, *P&P* editors feel that this survey is quite accurate in evaluating the state of bleach plant operations in the U.S.

We plan to conduct a follow-up survey next year, as the applications of new bleaching technology are expected to grow. We will again conduct a detailed survey of average bleach plant chemical usage in the hopes of evaluating the overall reduction of chemicals in the bleaching process nationwide—by the categories shown in Table 1.

CHLORINE DIOXIDE SUBSTITUTION. A recent publication reviewing 134 reports dating back to 1950 on chlorine dioxide substitution in the first chlorination stage of bleach plants revealed that moving from low substitution (4% to 15%) to high substitution (50% to 70%) does not produce significant benefits (Table 2).[1] All reports cited the many operating variables involved in the chlorination stage (temperature, retention time, chemical charge, pH, etc.) as affecting pulp and effluent properties differently. Differing sequences, mixing techniques and modes of addition (premixed or sequential) were also mentioned as contributing to the conflicting conclusions.

P&P's survey found that mills using low substitution, given the capital investment to do so, are satisfied with the results and do not plan to move into a ClO_2-dominated first stage.

Limitations of ClO_2 generating plants, the rising cost of sodium chlorate, and cheaper chemical substitution methods have been given as the major reasons for this decision. Pulp grade and bleach plant sequence (where ClO_2 is already used) are not factors in the decision to

TABLE 1: **Breakdown of fully bleached chemical pulp mills, grouped geographically and by process specifications.**

Total mills responding	69
Total bleaching lines	99
Total tonnage (tpy)	16,115,750
Total fully bleached chemical pulp capacity (tpy)	22,411,000
Capacity represented by survey	72%
Geographic distribution	
Region	**Number of lines**
South	51
Northeast	14
West	22
Midwest	12
Process distribution	
Species[1]	**Number of lines**
Hardwood	54
Softwood	64
Blends	6
Number of stages (towers)	
3	13
4	29
5	43
6	12
Displacement	3
End product[2]	
Market pulp	40
Fine paper	59
Tissue	12
Board	20
Fully bleached capacity (tpd)	
Capacity	**Number of lines**
700 and over	16
400–700	59
Below 400	34

1. Lines running both hardwood and softwood were counted twice.
2. Some lines produce more than one grade.

equipment and technology revealed

substitute ClO_2 for Cl_2 in the C stage. Reduced chemical consumption, viscosity increases, and effluent reduction are seen as the major reasons for adding ClO_2 in the chlorination stage.

OXYGEN-ENRICHED EXTRACTION. Predictions in last year's survey as to the growth of oxygen-enriched extraction were correct. The question that remained to be answered was: if a mill installs a high-cost, medium-consistency mixer and an oxygen supply system and provides proper time for retention, will it recover the capital investment through chemical savings within a reasonable amount of time? Fourteen mills are answering yes by installing 19 lines of oxygen-enriched extraction so far this year.

The economics are quite simple. Capital investment is typically between $100,000 and $500,000 (depending on the existing system) to bring the process online. Oxygen, at a cost of $0.05/lb, will replace chlorine dioxide (typically costing $0.50/lb to produce) in a 1.5:1 ratio. Results vary with each system, but the survey found most producers inject about 10 lb of oxygen/ton of pulp in the E_O stage, cutting ClO_2 usage in the latter stages by 6 lb/ton. Adding up the chemical cost difference for each ton produced and multiplying by the annual output of bleached pulp, the ROI should be greater than 85% when the capital investment is divided into the chemical savings. All mills using E_O during the last year agree with this conclusion, and mills that have not completed a full year of operation are confident that they will attain this project goal.

Last year the three major types of E_O processes known to be running were described. Two of those types remain in operation, and a few others have recently been employed. The major difference between processes is mixing technique. The cost varies proportionately to the type of equipment used. All existing sequences seem to be adaptable to oxygen addition, and more engineering design may be on the way.

The most popular method of oxygen-enriched extraction uses a dynamic, medium-consistency mixer. The mixer will accept pulp from a thick stock pump at 12% to 14% consistency. Pulp is rapidly mixed with injected oxygen in less than a second in the central portion of the unit. The mixer fluidizes the stock and oxygen in the mixing zone, allowing oxygen to adhere to the fiber and react quickly and thoroughly. The mixers have not experienced problems of plugging, and fiber damage has not been reported. The process continues as the mixer sends the pulp to a retention area.

Justification of the installation of a preretention tube has been a challenge due to its cost, space requirements and safety hazards. Typically a mill with an existing downflow extraction tower will build a tube for retaining pulp for 5 to 10 min. The tube generally is more than 45 ft high and is 4 ft in dia. Tube height is a major factor in maintaining back pressure in the vessel. Some suppliers and mills commented that the reaction time required is really 1 to 2 min, and if piping between mixer and tower retains the mixture that long, a tube may not be necessary. Upflow extraction towers do not need preretention tubes if sufficient pressure is maintained.

Two suppliers have introduced static mixers in this market. Static mixers cost about one-tenth the amount of mechanical mixers and, of course, do not have power requirements. They are easy to install, require less floor space, and are easy to maintain since there are no moving parts. Static mixers also use a medium consistency and give similar (but lower) benefits in chemical savings due to lowered consumption of more expensive chemi-

TABLE 2: **Summary of ClO_2 substitution benefits by amount substituted and pulp type.**

	Softwood kraft	Hardwood kraft	Sulfite
Pulp properties			
Yield	Cd = Dc	?	?
Shives	Cd = Dc	?	?
Physical strength	Cd = Dc	Cd = Dc	?
Viscosity	Cd = Dc	Cd = Dc	Cd = Dc
Chemical consumption	Dc > Cd	Dc > Cd	Dc > Cd
Brightness reversion	Cd = Dc	Dc > Cd	Dc > Cd
Effluent properties			
BOD	?	?	?
COD	Dc > Cd	Cd = Dc	?
TOC	Cd = Dc	Cd = Dc	Cd = Dc
Color	Dc > Cd	Dc > Cd	?
Chlorinated phenolics	Cd = Dc	Cd = Dc	?
Mutagenicity	Dc > Cd	?	Dc > Cd
Toxicity	Cd = Dc	Cd = Dc	?
Number of users[1]	Cd = 18 Dc = 4	Cd = 20 Dc = 4	Cd = 1 Dc = 0

Cd indicates below a 20% substitution of ClO_2 (as Cl_2).
Dc indicates above a 20% subsitution of ClO_2 (as Cl_2).
Cd = Dc means that low substitution is equivalent to high substitution.
Dc > Cd means high substitution is superior to low substitution.
? = Studies are inconclusive.
1. Lines with pulp blends are counted twice.

cals. Currently two U.S. mills, a Canadian and a Japanese mill are running E_O processes with static mixers.

Two new types of E_O systems are in trial operations in the U.S. One involves injection of pulp into a medium-consistency pump, which then send the mixture to a packed preretention tube. Another involves a special injector developed by Linde that disperses oxygen through the pulp without any mixing equipment. These methods are awaiting final evaluation before they are introduced into the market, but preliminary results indicate cost effectiveness comparable to the other techniques.

Contrary to last year's observations on the benefits of oxidative extraction, effluent reduction has not been reported as a benefit. Difficulty in measuring the components of effluent from E_O stages and the fact that no downward trend in effluent has been observed after installation of E_O make any claims of effluent reduction questionable. Effluent reduction had been a chief reason for an E_O study in many mills, and two U.S. producers rejected proposals based on that benefit.

PEROXIDE ADDITION. As reported last year, the addition of hydrogen peroxide in the bleaching sequence has a number of benefits. For a low capital investment (typically around $10,000) and easy installation, a mill can add peroxide to increase brightness, eliminate brightness reversion and reduce chemical consumption and effluent. Most mills reporting H_2O_2 addition trials last year have installed full online systems.

Peroxide can be introduced to pulp at the E_1 or E_2 stages, or enroute to the high-density storage tower. The survey found that most mills using H_2O_2 apply it at the latter part of the bleaching line for its brightness benefits. Chemical additions of around 5 lb/ton (on both species) seems to be a common usage. The survey did not find widespread peroxide use in the E_1 stage to reduce effluent. Peroxide additions continue to be cost effective as price stability of the chemical is maintained and consumption of higher-cost chemicals (such as ClO_2) is reduced. To install a system, a mill needs a storage tank, metering equipment and piping.

DISPLACEMENT BLEACHING. Almost a decade ago, the first displacement bleach plant was constructed by Kamyr Inc. for Temple-Eastex Inc. at Evadale, Texas. Technological advances in dynamic bleaching and the continuous diffuser led to further advances in the process, which is still being improved today. The latest U.S. installation, brought online at the end of 1983, was part of the modernization of Crown Zellerbach Corp.'s Camas, Wash. mill. By the end of this year, International Paper Co.'s mill in Georgetown, S.C., will be operating the largest displacement bleach plant in the world (Table 3).

The theory behind displacement bleaching is that relative movement between the pulp mass and chemical

TABLE 3: **Displacement bleach plants currently online or scheduled to go online.**

Company	Year of startup	Wood species	Capacity (a.d. tpd)	Designed bleaching sequence[1]
Eastex, Inc., Evadale, Texas	1975, 1978	Softwood	500	C/DEDED
Weyerhaeuser Co., Plymouth, N.C.	1976	Softwood, hardwood	500	C/DEDED
Kymi-Kymmene Oy, Kuusankoski, Finland	1977	Hardwood	170	C/D-E-D-EDED
Oji Paper Co., Ebetsu, Japan	1978	Softwood, hardwood	500	C/DEHED
Tofte Cellulosefabrik A/S Hurum, Norway	1980	Softwood	550	C/DEDE-D
A. Ahlström Oy Varkaus, Finland	1980	Softwood, hardwood	450	C/DEDE-D
Rio Grande Companhia de Celulose do Sul. RIOCEL, Guaiba, Brazil	1981	Hardwood	665	C/DE-DE-D
V/O Prommashimport, Svetogorsk, U.S.S.R.	1982	Hardwood	390	DEDED
Crown Zellerbach Corp. Camas, Wash.	1983	Softwood, hardwood	685	C/DEDE-D
Western Forest Products Squamish, B.C.	1983	Softwood	655	C/DEDE/D
Sappi Ltd., Ngodwana, South Africa	1983	Softwwod	660	D/CED
Pölser Zellulose- und Papierfabrik, Pöls, Austria	1984	Softtwood	640	D/CEDED
Oulu Oy Nouttasaari Mill Oulu, Finland	1983	Softwood, hardwood	850	D/CEDE-D
International Paper Co. Georgetown, S.C.	1984	Softwood	1,100	C/DEDE-D
Mishima, Japan	1985	Softwood	750	CEHED

1. Hyphens represent tower separation.

solutions increases the rate of bleaching. A continuous diffuser provides the movement to do this. The process actually starts outside the tower in a series of dynamic chlorination mixers where chlorine and chlorine dioxide are injected perpendicular to the feedstock. The first mixer "twists" the mixture into the second mixer and then sends it to a thick stock pump. From there the mixture is sent to the first stage of the displacement tower. The unit consists of levels of concentric rings, which govern the capacity of the unit, that have perforated plates on both sides of each ring. The rings are connected by a structure that carries the filtrate out of the tower and into filtrate tanks. In the center of the tower is a vertical rotating shaft that has hollow horizontal arms at each diffuser level with nozzles located between each ring.

Fresh chemical is pumped into packing boxes located on the top of the central shaft, where piping from the boxes delivers it to the hollow arms. The solution flows into the nozzles and is applied to the pulp. Suction between the rings draws chemical through pulp and helps to move pulp up to the next zone. The rings then drop back to their initial position to receive the next load. Pulp delivered by the rings receives the next chemical dose and the process repeats. The last displacement zone, on the top of the tower, is usually a wash stage. Earlier units had five-stages in the tower with a washer on top, but the later models use a conventional second tower, equipped with a diffusion washer, as a final chlorine dioxide stage to achieve a higher final brightness and avoid brightness reversion.

The benefits of displacement bleaching are well known. The most obvious fact is that a single- or two-tower bleachery requires much less space than a conventional design. In addition, displacement bleaching requires less power, less water, less steam and less manpower to operate. Capital investment is also competitive with conventional plants.

Some process design modifications have occurred recently. One is the replacement of the chlorination "twister" mixers with new medium-consistency dynamic mixers. Another modification occurred on the Camas unit recently. Mill engineers noticed that chemicals were not being sufficiently displaced between extraction and the first chlorine dioxide stages, and this was causing unusually high chemical consumption. They decided to switch the wash and the chlorine dioxide stages, which has proven successful.

In the planning stages at Camas and already implemented at two displacement bleacheries is the use of an oxidative extraction stage. Oxygen is injected through the central shaft just before the E_1 zone. Less oxygen is used compared with conventional processes, but the same benefits result. Tower height and proper turbulence in the zone are the chief variables for evaluating application of oxygen in the extraction zone of a displacement tower.

OXYGEN DELIGNIFICATION. Only one of the new greenfield mills starting up this year has employed oxygen delignification with short sequence bleaching. Suppliers believe that corporate mill officials have been a bit too conservative in their design philosophies in rejecting O_2 delignification. Nevertheless, published data on systems running this bleaching technique continue to be favorable.

There are currently five bleaching lines in the U.S. using a first stage to bleach pulp with an oxygen reactor. Worldwide production using this method will reach 16,000 tpd by the end of this year. The first U.S. system was brought online by Chesapeake Corp. at its West Point, Va., mill in 1973. The O_2 reactor is actually after the chlorination stage, a location that is still one of a kind today. The latest system is scheduled to start up later this year at Union Camp Corp.'s new greenfield mill in Eastover, S.C. The unit is the second to be utilized by the company, and is larger than the original 800-tpd process that started up in 1981 at Union Camp's Franklin, Va., mill. Most producers use a short CED bleach line after the O_2 stage to achieve the final brightness targets, but a few use regular five-stage bleaching but with less chemical addition.

Oxygen delignification uses high-consistency (25% to 35%) pulp stock. A fluffer on top of the reaction vessel receives the pulp from a thick stock pump or screw feeder and distributes the stock evenly on a top tray. Gaseous oxygen, typically around 28 to 35 lb/ton, is introduced at the bottom of the reactor and moves through these trays, which provide a large contact area of high-consistency pulp. Stock is normally retained for 25 to 50 min (depending on the particular system and setpoints of that system), and exit kappa number is typically one-half of what it would be following a first chlorination stage. Chemical consumption in the latter stages is therefore much lower, and as a result, bleaching costs are lower. Another major benefit of oxygen delignification is the reduction of effluent from the bleach plant. Mills surveyed that use O_2 delignification report effluent properties such BOD, COD, TOC, toxicity, and color are half of what a conventional five-stage bleach plant would discharge. They maintain that these benefits do offset the relatively high capital investment associated with O_2 delignification.

NEW LINES, SPLITTING OLD ONES. Two of the three new greenfield pulp mills in the U.S. have decided to utilize conventional five-stage bleach plants to achieve fully bleached pulp for market and captive use. Champion International Corp.'s new hardwood market pulp mill at Quinnesec, Mich., will use a C_DE_ODED sequence to bleach pulp to a 90 GE brightness. The new Great Northern Nekoosa Corp., Leaf River, Miss., mill will use a C_DE_ODED sequence to bleach kraft pine to market pulp brightness. As mentioned before, Union Camp's new mill will use oxygen delignification before a conventional C_DE_ODED process for fine paper production, and Crown Zellerbach's Camas modernization project has already started up a four-stage displacement bleach tower followed by a conventional final ClO_2 tower, also for captive use.

The new dynamic medium-consistency mixers have created an opportunity for mills to expand bleaching capacity by splitting the bleaching line. Two mills in the U.S. have already accomplished this, and two more are actively seeking the capital to achieve it.

A published report revealed one example of how a mill added digester capacity and needed cost-effective relief of a bottleneck in the bleaching process.[2] After installing a dynamic medium-consistency mixer and experiencing the promised benefits, the mill decided to convert the existing five-stage bleachery into a parallel sequence with common chlorination. The caustic extraction stages were converted to oxidative extraction and then fitted with medium-consistency mixers. The stock flow will travel through a conventional chlorination stage, split into the parallel E_OD lines and rejoin at the final chlorine dioxide washer. The new process has achieved brightness specifications for both hardwood and softwood and has maintained pulp quality. It was also found that ClO_2 usage was reduced 4 lb/o.d. ton on hardwood and 7 lb/o.d. ton on softwood.

One mill in Sweden (*P&P*, July 1984, p. 136) split its bleach line after installing an oxygen delignification system and a E_O system with the high-shear mixing

Medium-consistency bleaching is catching on

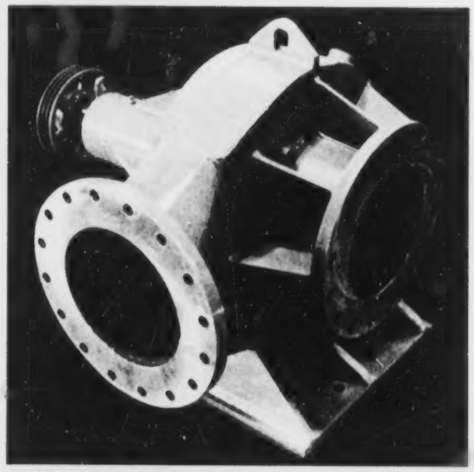
Medium-consistency (10% to 15%) bleaching is quickly becoming a standard operating process throughout the world (see table below). The new dynamic mixers fluidize stock and chemical inside the mixing zone of the unit, creating a blend that is ideal for reactivity. This technique has helped to lower bleaching production costs by more efficient mixing and has enabled existing sequences to apply cheap chemical additions and substitutions. The new equipment is expensive but the return on investment is quite reasonable (usually less than one year).

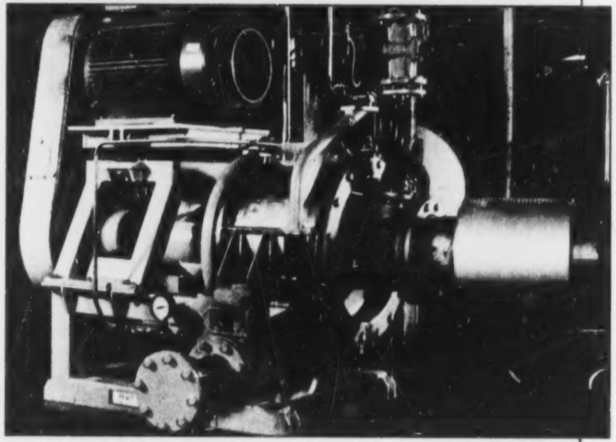
Although medium-consistency operations are not new in the pulp mill (continuous digesters run above 10%), the latest successes in bleaching may trigger other process evolutions for medium-consistency applications. Reduced water and energy requirements make medium-consistency processes attractive. Pulp washing and screening are currently being investigated for commercial application. However, until some antiflocculation mechanism is discovered for pulp suspensions, medium-consistency sheet forming will still be an industry fantasy.

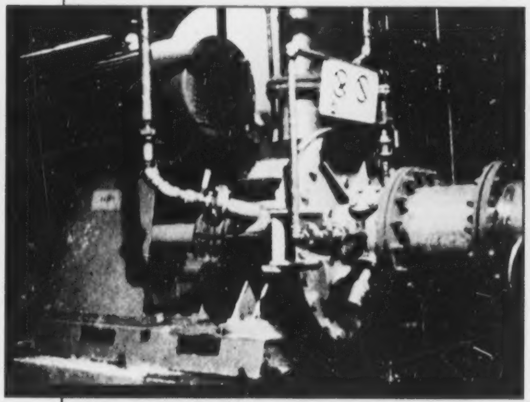
TABLE 4: **Operating specifications for dynamic mixers.**

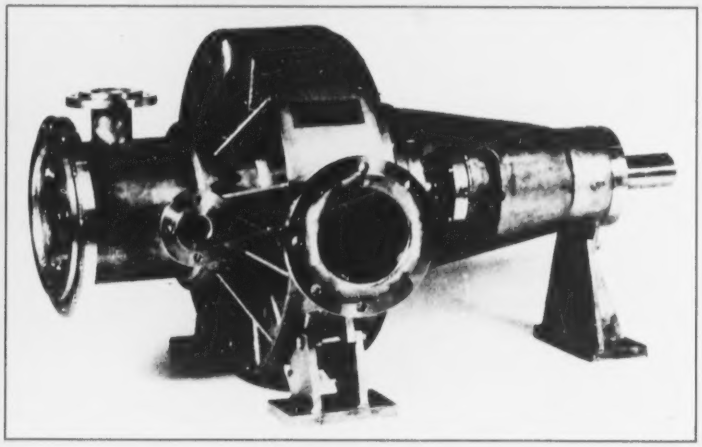
	Beloit/ Rauma	**Kamyr**	**IMPCO**	**Sunds Defibrator**
Sizes (tpd)	600,800	600	600	600
	1,000	1,000+	1,000+	1,100
Dimensions (ft^3)	47	45½	57	50
	70	74¼	270	86⅔
Rpms	530/680	1,000	980/650	735
Motor (hp)	125/200	150/200	125/200	100/270
Consistency range	10–15	8–16	10–15	3–15
Installations*	17	79	33	43
Chlorine	2	10	2	10
Chlorine dioxide	5	44	10	16
Oxidative extraction	10	21	21	13
Others	0	4	0	4

* Sold units worldwide.


IMPCO high-shear mixer.


Sunds SMA mixer.


Rauma-Repola mixer.


Kamyr MC mixer.

technique and observed similar benefits to the ones mentioned above.

BLEACH PLANT AUTOMATION. The survey revealed continued implementation of process control equipment in bleach plants. Growth of single-stage control seems to be stronger than full control systems in numbers of installations, but many of those installations lead to full bleaching process automation. As with most bleach plant modifications, the existing system and capital available dictate how control is applied and how much. With equipment installations that improve mixing, retention and washing, new instrumentation and control equipment will prove and improve the application of the new process equipment.

The major reason for installing instrumentation and control equipment is reported to be increased accuracy in achieving brightness targets with improved cost efficiency. Flow of stock and chemicals into the towers and the parameters (pH, temperature, retention time, etc.) resulting fron the reaction are monitored for various stages. Control of flows are governed by process variable readings, which can be read foward and/or back. A typical five-stage operation would have between 20 to 50 process measurements and 10 to 15 control outputs.

A single-stage system will use the control variables with the process variables in combination or independently, depending on the manufacturer. Sensor probes mount on a tower and measure variables online using inline or filtrate flow loops. The information is gathered and sent to a microprocessor that uses data in a setpoint controller program, which outputs control modifications. Optical sensors measure brightness, and chemical sensors measure the residual chemical. The sensors and microprocessors work well in the mill environment. A system for control of a single stage will generally cost between $50,000 and $100,000 and pay for itself by optimizing bleaching efficiency (reduced chemical and energy cost) while maintaining a quality product.

Total control systems for the bleaching process (from brownstock washing to high-density storage) are typically ten times larger in capital investment than single-stage control, but offer one-station control over all process variable control and verification. They monitor the bleaching process throughout the plant, controlling flows and reactions as incremental or total production changes occur.

The systems will also retrofit to existing single-stage control and will contribute to millwide control. Original installations of total control systems can be reconfigured for chemical substitution and addition and other sequence modifications. The systems use a series of optical and chemical sensors along the bleaching line that gather data and send it to a centralized operator station with multicolor video displays for each stage. The operator can access setpoints for change and/or watch setpoint controllers act on information from the sensors.

The payback for these systems is also in optimum bleaching efficiency but on a larger scale than a single-stage control system. A major factor in capital investment is the existing instrumentation, which can double the cost of installing a total control system.

WASHING. Following each bleaching stage is a washer, and competition between suppliers of the two types of washing systems has been heated. For existing systems, modifications of washer shower design and preemptive measures for fighting corrosion have been observed. Use of filtrates have also increased in popularity for more efficient washing of pulp.

The Kamyr continuous diffuser has been applied to both conventional and displacement bleacheries for washing and continues to equally share new installations with rotary vacuum drum washers. The diffusion washers are available in single-stage or dual-stage configuration. The units are made of solid titanium and are fully enclosed.

Uniflow washer head installations reportedly were popular again this year. The heads reduce water consumption while improving washing efficiency. Ingersoll-Rand's IMPCO Div. has also entered the washer head market with a new design that retrofits to its drum washers and reduces chemical carryovers with an improved washing shower head. Many mills also reported coating washers with anti-corrosive material (such as Kynar) to lengthen the life of the units.

EFFLUENT CONSIDERATIONS. The bleach plant has always been the major contributor to mill effluent discharges. Many innovative ways of reducing the effluent load in the process are now being investigated commercially. Implementation of many is still not economically feasible, but more stringent environmental laws will help to speed up effluent treatment technology. New lines such as displacement and oxygen delignification have started the trend, but the challenge remains for existing processes.

Color particles (sometimes referred to as "mi-cells") are released into water streams from the bleaching stages. These streams are treated by chemical neutralization, electrochemical processes and filtering before discharge to the environment.

The use of filtrates in bleaching lines for washing has helped to reduce effluent color by reactions that produce oxidizing agents. Elaborate electrochemical oxidation and ultrafiltration systems are currently being studied on commercial sites and have reported successful results.

BLEACH PLANTS OF THE FUTURE. The major suppliers of bleach plant equipment are investigating new ways of bleaching pulp. New technology will improve pulp quality, reduce effluent loads and bleach pulp more economically. The new plants will also be competitive in price compared with conventional plants.

Kamyr has already introduced diffusion bleaching, which allows a plant to bleach and wash pulp in fully enclosed towers. Kamyr is improving on this design by adding pressure to the tower, which will reduce pumping requirements. The design is being evaluated in pilot plant studies, and commercial installation is not far away. IMPCO is currently working on "Low-Level Bleaching," but information on this new concept was not available at press time. ■

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Finishing/
Converting

Finishing and converting upgrades

New printing technology and changing paperboard uses have prompted rebuilds and installation of modern finishing and converting equipment

By MATT COLEMAN, Engineering Editor

■ In-house finishing and converting operations, particularly sheeting, have changed significantly in recent years to keep pace with market demands. New cut-size cutter/sheeter lines have been installed in fine paper mills while in many cases older equipment, such as "rough-size" trimmers (guillotines) for coated paper, are being retired as printing technology continues to evolve. Improved printing press designs and lower operating costs, for example, have led many printers to change from sheetfed to webfed presses, reducing the need for large-size sheeting capacity in printing grades. Offsetting this has been an increased use of plain paper copiers, which in turn has increased the need for cut-size sheeters, mostly for free-sheet grades.

CUTTER/SHEETER DISTRIBUTION. Table 1 shows cutter/sheeter and trimmer distribution by region in 1979 vs 1983-84 for mills producing fine-, printing-, and publication-grade paper. All regions except the West increased the total number of cutter/sheeter lines with the Lake States region showing the most dramatic increase in this type of equipment. Modernization of the finishing operation is reflected in the increase in new cutter/sheeter lines and in the decreasing use of trimmers, which produce a rough-size large sheet (folio or equivalent that needs further cutting to reach exact customer specifications).

These trimmers are generally used in coated paper operations, especially heavyweight coated paper, to produce sheets for sheetfed presses. Lightweight coated (LWC) paper use has increased in recent years due primarily to rising postage costs for magazines—the major users of coated stock. LWC is primarily sold in rolls for use in webfed presses. Improved and less expensive webfed presses can now compete for a large portion of the short-run printing that had previously been served by sheetfed presses running the heavier weight paper.

Lightweight coated groundwood, the staple of the U.S. magazine industry, has been in tight supply for the last year—there are indications that actual shortages may soon occur. Imported European coated paper and coated free sheet, both premium priced compared with coated groundwood, have been the only alternatives for small- or medium-size printers left without dealer allocations. Coated paper imports are up 300% over last year. Imported paper runs 10% to 20% higher in price than domestic coated groundwood.

BOXBOARD CONVERTING. Table 2 shows the changes in boxboard and industrial-grade sheeting equipment between 1979 and 1983. As with fine and printing paper grades, all regions except the West showed an increased use of this equipment. This occurred in spite of static production levels (Table 3) and two recessions during that time. Many roofing felt mills (included under industrial-grade equipment) and boxboard mills are now shut down, but the converting equipment is still included in Table 2.

The overall increase shown in Table 2 is somewhat deceptive in that operating rates, specifically for some boxboard grades, have been extremely low. The upturn in the economy that began in the fourth quarter of 1982 has had varying effects on industrial grades with roofing and recycled board benefiting the least. In recycled board, overcapacity in all regions except the West has kept prices low. In the West the market is strong enough to keep prices up but more capacity is due to start up.

Solid bleached sulfate (SBS) board, which once dominated the market, lost share to coated recycled board during the 1970s. The recycled board machines that were added to compete with the SBS machines created some overcapacity. However, a number of these recycled board machines were shut down or ran at reduced rates during the recession. The introduction of solid unbleached sulfate (SUS) board added additional competition to a generally static market. SUS market gains came at the expense of the other two grades. This competition

TABLE 1: **Fine paper and coated paper converting machinery distribution by region, 1979 and 1983.**

	1979		1983	
Region	**Cutters/ sheeters**	**Trimmers**	**Cutters/ sheeters**	**Trimmers**
Northeast	107	104	111	91
Southeast	70	52	74	35
West	25	15	24	14
Midwest	129	141	161	120

reflect changing market demands

has apparently led to increased sheeter capacity, with each new or converted machine requiring some new sheeter/cutter/trimmer combination. However, recent trends (P&P, Aug. 1984, p. 13) show that SBS has recovered sharply in 1984, while continued price weakness in recycled board has led to some mill closures.

Coated boxboard (especially recycled boxboard) has been hard hit by competition and overcapacity. Operating rates were 82% in 1983 and are expected to reach only 88% in 1984. (SBS operating rates were 95.6% in 1983 and could reach 98% in 1984.) The low operating rates have led to weak prices and several mill closures and mill sales. Recently, St. Regis Corp. in Coshocton, Ohio, closed its boxboard mill while Bird & Son Inc. has sold its recycled board mill in East Walpole, Mass.

Chipboard (uncoated recycled boxboard) has been relatively strong because of its use as gypsum board liner. The market is as strong as it was during the 1979 housing boom, according to some market sources.

Recycled boxboard market share is also being eroded by the SUS producers. Greater strength (especially wet strength) make SUS attractive, notably in detergent boxes. Shipments to carton converters were up 13% in 1983 compared with 1982 vs only a 4% increase for clay-coated recycled board during the same period.

Roofing grades are still in a depressed market, with lower housing demand and a general industry transition to fiberglass mat instead of pulp mat pressuring all producers. CertainTeed Corp. recently announced plans to phase out five mills, representing 30% of its capacity. Early this year, GAF Corp. closed three of its 15 roofing mills.

EQUIPMENT CHANGES. Within the boxboard section of the industry, observers look for a gradual shakeout of producers. The weakest mills are expected to go first, which will put some relatively new equipment on the used-equipment market. Most see the converting operations remaining stable, with mills having long-term contracts or specialty contracts continuing to do in-house sheeting. Only the largest carton/box converters will purchase boxboard in rolls.

The converting process in roofing mills will probably not change even with the switch to fiberglass mat. The number of closures and weak prices will make additional improvements in this area unlikely in the near future.

Continued strength in coated paper and uncoated free sheet should lead to more equipment in this area. New cut-size sheeters for copier and writing paper are anticipated. Possible new coated paper mills may include sheeting capacity, and rebuilds of older mills will increase capacity and possibly lead to new equipment purchases (Table 4). ■

TABLE 2: **Boxboard and industrial paper converting machinery distribution by region, 1979 and 1983.**

	1979		1983	
Region	**Cutters/ sheeters**	**Trimmers**	**Cutters/ sheeters**	**Trimmers**
Northeast	58	71	83	81
Southeast	46	43	51	52
West	17	16	18	16
Midwest	58	82	64	66

TABLE 3: **Paperboard and fine/printing paper-grade production since 1979 (000 short tons).**

	1983	1982	1981	1980	1979
Printing, fine paper	14,403	12,869	12,786	12,541	12,390
Boxboard, industrial	14,944	14,165	14,887	14,710	n.a.

n.a. = Not available.

TABLE 4: **Capacity additions in fine/printing paper, 1979-1984.**

Startup date	Company	Mill site	Capacity (000 tpy)
Uncoated free sheet			
1979	Champion	Courtland, Ala.	150
1979	GNN/Nekoosa	Ashdown, Ark.	130
1980	Boise Cascade	Wallula, Wash.	140
1981	Mead	Chillicothe, Ohio	179
1981	Willamette	Hawesville, Ky.	100
1983	Champion	Courtland, Ala.	140
1984	Crown Zellerbach	Camas, Wash.	160
1984	Union Camp	Eastover, S.C.	210
1983	MB/Island Paper	N. Westminster, B.C.	80 m
1984	Great Lakes Paper	Dryden, Ont.	122 m
Coated free sheet			
1981	Boise Cascade	Rumford, Maine	159
1982	Scott/Warren	Skowhegan, Maine	200
Coated groundwood			
1980	Consol/River	Stevens Pt., Wis.	103
1980	Midtec Paper	Kimberly, Wis.	125
1982	Mead	Escanaba, Mich.	200
1982	St. Regis	Sarteil, Minn.	170
1982	Weyerhaeuser	Columbus, Miss.	175

Wastepaper outlook good for '84,

Paper industry speakers discuss the world market and future of industry; steady growth predicted throughout this year to level off in '85

By DEBRA A. ADAMS, Senior News Editor

■ Consumption of paper stock will continue at a steady rate through the rest of this year in the U.S. and many parts of the world, but the long-term outlook is not as optimistic, with some forecasts calling for a worldwide recession within the next two years, according to speakers at the National Assn. of Recycling Industries' (NARI) Paper Roundtable, July 18, in Chicago, Ill.

Rising interest rates and a huge federal deficit in the U.S. are threatening to thwart the economic upturn that began to boost the paper industry during the last half of 1983 and continued through the first half of this year, industry speakers reported. Some fear a recession as early as next year, although most feel 1985 will be relatively flat.

Paper stock buyers representing gypsum, tissue, and newsprint mills all reported at the Roundtable that they expect their businesses to continue at a healthy pace through next year—with only minor cyclical downturns—and they feel their consumption of secondary fiber will continue at its present robust rate during that time.

Robert Hellminski from U.S. Gypsum Co. in Clark, N.J., reported that the paper stock market in the New Jersey area was sloppy early in July, but attributed it to the normal summer slowdown of many industries. The gypsum market, however, continued strong into midsummer, with customers firm on allocation and pricing. These conditions should continue until fall, when demand should level off, he said.

OLD NEWSPRINT GLUTS THE MARKET. Larry Domark from FSC Paper Corp.'s recycled newsprint mill in Alsip, Ill., said the outlook for newsprint for the rest of 1984 is excellent, and he expects "record-breaking demand for paper stock" to continue until year-end, with exports picking up in the fall. Wastepaper supplies, however, should be adequate. In early July, old news supplies were plentiful, he said.

Rick Moore, of Statler Tissue Co., Augusta, Maine, said the tissue industry presently is experiencing one of its cyclical downturns, with an oversupply situation due to capacity increases and intense competition. Statler Tissue uses 100% recycled fiber. Moore expects the tissue market will pick up again later this year, however, and that it will remain strong through most of 1985.

The export market has experienced some changes affecting wastepaper consumption in recent years and this is expected to continue to change buying patterns outside the U.S. for some time to come. European demand has been tapering off since 1980, while consumption in places such as the Far East and Canada is on the rise, the speakers indicated.

Mike Millis of Omega International Corp., Jenkintown, Pa., said European demand for U.S. secondary fiber has dropped 59% since 1980, with only 118,000 metric tons expected to be shipped there in 1984 compared to 288,000 tons in 1980. He attributed the decline to the rise in the U.S. dollar, higher freight rates and customers switching from U.S. suppliers to other sources in Europe and iron curtain countries.

"I've never seen a situation in Europe like there is today," said Millis. He noted that while all other markets—Far East, Canada, Mexico and the U.S.—have broken records in their consumption levels this year, Europe has been declining. "I don't think we can recover from it," he said.

MEXICO A PROMISING MARKET. Mexico is one of the promising future markets for wastepaper exports, according to Richard B. Garrett, of Consolidated Fibres Inc., Dallas, Texas. Mexico will become a more important trading partner with the U.S. once it resolves its financial problems.

Mexico continues to suffer from a weak economy, which has curtailed paper production and capital expenditures, and Mexicans have cut down on luxury items such as disposable diapers and paper napkins. Mills are planning for the future, though. Kraft paper mills are considering switching to linerboard production and fine paper mills are looking at converting to specialty papers, Garrett noted.

The most important sign in Mexico now, though, is the country's aim to increase its exports, which will eventually result in greater consumption of secondary fiber, according to Garrett. During the first six months of this year, Mexico imported more paper stock then in all of 1982, but Garrett said he doesn't expect this rate of demand to continue because inventories are currently high. In good years, Mexico consumes about 1.5 million

NARI Roundtable speakers report

metric tpy of secondary fiber, 900,000 tons of which Mexico generates domestically, he explained.

Canadian consumption of U.S. wastepaper has also been good so far this year, and it is expected to continue through year-end, said Irving Yenoff, of Domtar Packaging, Depew, N.Y. Canada imports approximately one-third of its secondary fiber and virtually all of it comes from the U.S., he said. Yenoff expects that 1984 will be an even better year than 1983, but that 1985 or 1986 will probably see a decline, though not as severe as the one in 1981-82.

In the first quarter of this year, Canada's demand for wastepaper was up 10% from a year earlier, but consumption should drop off for the rest of the year, said Yenoff. The brown grades have been flat for months and pulp substitutes have stopped climbing on the Canadian market. "I think we've gone as far as we're going to go in this business upturn," he said.

Yenoff expects 1985 to be flat and 1986 consumption to decline by 3%. A further devaluation of the Canadian dollar would put even greater downward pressure on imports of paper stock, he noted. The most optimistic forecast for secondary fiber is for the deinking grades, with two new tissue machines recently starting up in Ontario and British Columbia.

KOREA TO EXPAND USAGE. The Far East will also remain a viable market for U.S. wastepaper exports, according to William A. Nielsen of Nielsen & Nielson Inc., Pomona, Calif. The largest consumer of paper stock in the area—South Korea—has increased its usage by 3% to 5% in the past 15 years, he noted. He expects the country to expand the number of grades it currently uses from newsprint, tab cards, and computer printout to less conventional grades such as white and colored ledgers. Consumption of old corrugated containers is also on the rise, he said.

Taiwan will continue to use a wide variety of paper grades, and its consumption is on the rise with an expected 150,000-tpy increase in its paper industry capacity within the next year. Japan, which buys mostly news and OCC, will continue to seek shipments from the U.S., but its buying patterns will remain sporadic, coming in and out of the market at three-month intervals, said Nielson.

In addition to increases in capacity, declining freight rates will also cause a rise in shipments to the Far East. He said the average freight rate between New York and South Korea is $20/ton, and it could drop more this year. Forecasters expect the Pacific Rim countries' economies to grow about 10% annually. The paper industries there should expand 8% to 10% a year, according to Nielson.

The one impediment to a good paper stock market in this area could be the introduction of cheap virgin pulp from Europe, where pulp production has begun to peak, Nielson said. If this happens, the market in the high grades of secondary fiber should start to come down. He expects demand from the Far East in the fourth quarter to remain strong, with South Korea being the strongest market.

R.K. Chopra of Ratna Overseas, New Delhi, India, expects the Indian paper industry to grow by 4% a year—100,000 metric tpy—through 2080. Presently, the 2.06-million-tpy industry is operating 222 mills, with another 24 mills set to come onstream later. The industry has been depressed, however, and operated at just 58% of capacity in 1983, he noted.

"Wastepaper will play an important role in achieving the rate of growth fixed for the industry in the years to come," said Chopra. The biggest obstacle, he said, are freight rates that keep down importation of bulk grades such as mixed and OCC. CPO, however, is selling like "hot cakes." This year India expects to import 150,000 metric tons of wastepaper, with 40,000 to 50,000 tons coming from the U.S. ■

TABLE 1: **Paper stock exports to major consuming countries, January to May, 1980-1984.**

Country	1980	1984	Change (%)
Canada	232,391	138,105	− 40.6
Mexico	261,462	212,486	− 18.7
Venezuela	53,160	46,429	− 12.7
North/South America	561,551	411,099	− 26.8
France	20,836	9,211	− 55.8
Italy	80,425	17,182	− 78.6
Spain	14,326	29,712	+107.4
Europe	126,401	77,786	− 38.5
India	3,200*	11,508	+259.6
Japan	138,426	150,863	+ 9.0
South Korea	220,851	281,455	+ 27.4
Phillipines	19,144	18,865	− 1.5
Taiwan	105,196	312,086	+196.7
Far East/Australia/Oceania	499,876	812,237	+ 62.5
Total	1,187,828	1,301,122	− 9.5

Source: National Assn. of Recycling Industries from Dept. of Commerce.
*Estimate based on other monthly data 1980 from Dept. of Commerce.

Favorable supply/demand equation adds up to firm U.S. markets ahead

Though the strong dollar may be hurting exports, limited expansions and surging demand brighten the prospects for U.S. producers

By CARL ESPE, News Editor

■ With demand up and only limited capacity additions ahead in the next few years, financial analysts got an upbeat report from industry speakers on the prospects for major grades of pulp, paper and board at the Forest Products Seminar, sponsored by the Financial Analysts Federation in Seattle, Wash., June 18-20.

Although exports to Europe have been hurt by the strong U.S. dollar and a weaker recovery in European economies, demand in Pacific Rim countries continues to grow. And in domestic markets, pulp and paper companies are enjoying the benefits of the booming economy, with U.S. production of paper and paperboard continuing at a record pace.

FIRM PULP MARKETS. Continued growth in market pulp demand and limited capacity expansion indicate a relatively firm market for pulp over the next two years, Fred Robertson, president of Mead Pulp Sales Inc., told analysts. He said the market is currently faced with more than the usual amount of uncertainties, partly due to the impact of the British Columbia strike that resulted in the loss of 700,000 tons of production earlier this year. "Nevertheless," he said, "prices have firmed, discounting has virtually disappeared, and orders are flowing at normal rates."

Market pulp shipments from Norscan and other countries jumped an unprecedented 19% last year to a new record of 22.3 million tons, up from 18.9 million tons in 1982. About 15% to 20% of this 3.356-million-ton jump probably went into buyer and broker inventories, while the rest was consumed, Robertson estimated. Most of the inventory building probably took place in western Europe, People's Rep. China, Asia (excluding Japan) and Africa.

The International Statistical Committee of the North American & Nordic Producers Assn. has estimated that world chemical paper-grade market pulp demand will grow 5.0% from the record 22.3 million tons shipped in 1983 to 23.5 million tons in 1985.

Western Europe, which consumes about 40% of world pulp shipments, should show relatively slow demand growth. This reflects slowing economic growth (1.2%/year between 1982 and 1987) and further market inroads by integrated Scandinavian producers. Demand in Pacific Rim markets, however, should continue to rise at a rapid pace. And the fluff pulp market, which is now around 1 million tons, will continue to grow at several times the rate of paper end uses, Robertson said.

SLOW CAPACITY GROWTH. North American and Scandinavian capacity for chemical paper-grade market pulp will increase by only 4%, or 780,000 metric tons, over the next two years to 18.55 million metric tons in 1986. The three Nordic countries will show a small decline over this period, while Canadian capacity will rise

TABLE 1: **World chemical paper-grade market pulp capacity, potential production, demand (000 metric tons).**

	1982	1983e	1984e	1985e
Capacity				
Total world[1]	24,510	24,880	25,280	25,875
Potential production[2]				
Total	22,790	23,230	23,000[3]	24,135
Demand				
Canada	610	735	790	800
U.S.	3,940	4,725	4,950	4,900
Nordic	820	980	990	945
Western Europe	8,120	9,145	9,500	9,450
Eastern Europe	260	255	240	240
Latin America	935	1,015	1,050	1,100
Japan	1,950	2,265	2,550	2,700
Oceania	275	255	240	240
Asia/Africa[4]	2,075	2,960	2,925	3,075
Total	18,985	22,335	23,235	23,450
Ratio				
Demand/potential production	83%	96%	101%	97%

e = Estimate.

1. Excluding eastern Europe and People's Rep. China.
2. Potential production: 95% of capacity for North America and the Nordic countries, 90% of capacity for western Europe, Japan (and Latin America 1983-85), 85% of capacity for others (and Latin America 1982).
3. Partially adjusted to include tonnage lost in British Columbia strike.
4. Including People's Rep. China.

Source: American Paper Institute.

by only 2%, or 150,000 tons. The biggest increase, 670,000 tons, will occur in the U.S., where two large projects will start up this year.

Additional pulp capacity from non-Norscan sources is expected to rise by 7%, or 510,000 tons, between 1983 and 1985. This does not include the U.S.S.R. and eastern Europe, which are not expected to expand production significantly for several years. (The U.S.S.R.'s exports to western Europe in 1983 amounted to about 250,000 tons, up from 205,000 tons in 1983. Czechoslovakia added about 50,000 tons to its exports in 1983.)

Brazil continues to make good progress in developing exports of its eucalyptus hardwood pulp. Exports have grown from 273,000 tons in 1978 to an estimated 930,000 tons in 1983. Over the same period, eucalyptus has grown from 24.7% of total world bleached hardwood production to an estimated 33.6% in 1983. Brazil in 1983 was the largest bleached hardwood pulp exporter, followed by the U.S. (837,000 tons), Finland (596,000 tons), and Portugal (479,000 tons).

The International Statistical Committee projects that demand to potential production ratios for Norscan producers will rise from 94% in 1983 to 102% in 1984 after adjustment for the British Columbia strike and 96% in 1985. (Potential production is based on 95% of capacity.) Operating rates worldwide, including both Norscan and nontraditional producers, would be slightly lower over the same period (Table 1).

Robertson said that the ratio of demand to potential production over the 1978-80 period was similarly strong, ranging from 92% to 100%, and during this period the industry achieved seven consecutive quarterly price increases. The economic forecasting firm, Data Resources Inc., is projecting an average price for northern bleached softwood kraft in 1986 of $700/metric ton, up from the present price of $540/metric ton, he noted.

The strength of the dollar has dramatically altered the comparative cost relationships among major world pulp producers in recent years, Robertson said (Table 2). His latest estimates of average manufacturing costs (excluding interest, depreciation and delivery costs) show that western Canada is the lowest cost producer in softwood ($277/metric ton), followed by Sweden ($289). The U.S. South is high ($335). Scandinavian, however, have the lowest delivered cost to western Europe.

FAVORABLE LINER MARKETS. U.S. kraft linerboard supply and demand should remain in favorable balance over the next couple years, two paper industry executives told security analysts attending the meeting.

Carl W. Geist Jr., vice president of containerboard for Weyerhaeuser Co., projected total U.S. linerboard demand would rise 6.7% in 1984 to 17.1 million short tons and 3.7% in 1985 to 17.8 million tons. With capacity only expected to show limited growth, this would result in operating rates of 96% this year and 98% in 1985.

Domestic kraft linerboard demand will be helped by a projected 7.0% rise in U.S. corrugated box shipments in 1984 followed by a 4.0% rise in 1985. Box shipments closely track industrial production, which is expected to rise 12.4% this year and 6.0% in 1985, he noted.

The strong U.S. dollar may contribute to a slight decline in U.S. liner exports from 2.1 million short tons in 1983 to 2.07 million tons this year, but shipments should rebound to nearly 2.3 million tons in 1985.

PACIFIC RIM GROWTH. Export demand from the Pacific Rim countries will continue to show the strongest growth, he said. Since 1979, the Pacific Rim's share of U.S. kraft linerboard exports have nearly doubled, from 15.6% to 30.2% in 1983, while Europe's share has declined from 39.5% to 33.6%.

A strong economic recovery will continue in Japan through 1985, lifting demand for boxes and linerboard. Domestic Japanese linerboard consumption should rise about 10% to 3.96 million metric tons in 1984 and 8% to

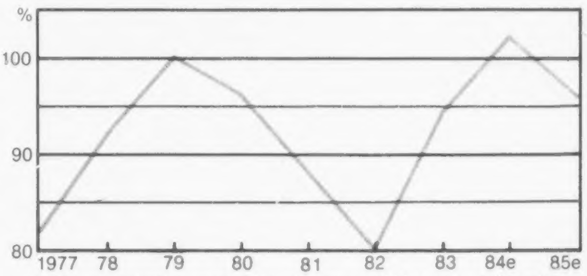
TABLE 2: **Estimated 1984 average costs of producing bleached kraft paper-grade market pulp at existing mills (US$/a.d. metric ton).**

	Softwood			
	Western Canada	**Sweden**	**Finland**	**U.S. South**
Fiber	109	184	227	120
Chemicals	41	31	26	50
Energy	36	12	8	45
Wages/salaries	49	35	31	60
Other	42	27	27	60
Total¹	**277**	**289**	**319**	**335**

	Hardwood				
	Brazil	**Portugal**	**Sweden**	**Finland**	**U.S. South**
Fiber	55	55	146	155	103
Chemicals	20	31	22	27	41
Energy	15	26	15	10	53
Wages/salaries	27	33	33	31	60
Other	40	55	25	27	67
Total¹	**157**	**200**	**241**	**250**	**324**

1. Excluding interest and depreciation. Source: Mead Pulp Sales Inc.

FIGURE 1: **Ratio of Norscan shipments to potential production through past two business cycles, 1977-85.**



Potential production equals 95% of capacity. 1979 data are adjusted for capacity overstatement. Source: Mead Pulp Sales Inc.

Nevertheless, imports of kraft liner into Japan will probably not surge due to strong demand and attractive prices in the U.S. and other world markets, Geist said. He projected that total Japanese liner imports would rise from 240,000 metric tons in 1983 to 297,000 tons in 1985.

Over the longer term, the Japanese market outlook is highly positive, with corrugated box shipments forecast to rise at a 4% to 5% annual rate. "Supply to meet this market growth will come more from kraft linerboard imports rather than from Japanese capacity increases," Geist said. "Stronger yen and higher imported fiber and energy costs will lessen competitiveness of the Japanese containerboard industry relative to U.S. West Coast mills." One of the challenges for the U.S. industry, however, will be to meet Japanese linerboard quality requirements in regard to compression strength, printing surface and other factors.

WESTERN EUROPE. Geist projected western European kraft linerboard demand would rise 2.2% to 2.55 million metric tons in 1984 and 2.3% to 2.6 million tons in 1985. U.S. exports to western Europe, however, are expected to decline from 660,000 metric tons in 1983 to 605,000 tons in 1984 and then rebound to about 660,000 tons in 1985. U.S. exports are being hurt by the slower economic recovery in most European countries and the competitive advantage of Scandinavian kraft liner and Continental test liner suppliers due to the strong U.S. dollar.

Frederick V. Ernst, group vice president for pulp and paper of Chesapeake Corp., noted that one of the factors contributing to the favorable domestic supply/demand balance for kraft linerboard is limited capacity expansion. According to revised American Paper Institute data, U.S. capacity is expected to rise only 1.8%/year over the 1984-86 period.

LIMITED CAPACITY GROWTH. Chesapeake is the only company to announce plans to install a new kraft linerboard machine over this period, although Inland Container Corp. is building a new recycled linerboard mill in the Los Angeles, Calif., area.

Part of the reason that companies have not jumped to add new capacity is that "there has been a major effort in the last several years to eliminate bottlenecks and gain incremental capacity on existing machines," Ernst said. High-loaded presses such as the Extended Nip press on wet ends of paper machines are an example.

He noted that API recently revised its 1984 capacity figures by some 455,000 short tons, or 2.5% above the figures reported in early 1983. "More than half of this additional capacity appears to be related to previously unannounced increases in mill productivity."

SWING CAPACITY. A considerable amount of swing linerboard capacity is available that had previously been used to make kraft paper grades. Of the 455,000-ton increase announced by API, an estimated 210,000 tons have come from kraft paper capacity being shifted to linerboard, Ernst noted.

Multiwall sack kraft paper demand has been depressed by the recession and the federal government's Payment-In-Kind program, but demand may bounce back to its previous level of around 1.0 million tons. But the 2.2-million-ton grocery bag and sack market faces serious competition from plastic film, and some predict that plastic bags will capture 25% or more of the grocery sack market in the next few years, Ernst said.

"While there is a great deal of controversy as to the degree to which plastics will penetrate this market, we have no doubt that plastics will turn grocery bag and sack usage into a declining market." However, a recent study by API indicates that plastic inroads into this market may be increasing at a slower rate after reaching about 5% in 1983, he said.

Kraft paper capacity has been declining for a number of years, dropping from 4.3 million tons in 1977 to an estimated 3.7 million tons in 1984 (excluding another 150,000 tons that will be swung to linerboard and 290,000 tons that will be converted to bleached paper grades over the next two years).

"So while future linerboard capacity will certainly be affected by incremental expansions and by a gradual shift of capacity from kraft paper to linerboard, this is essentially being accounted for by the negative growth in kraft paper capacity and the very minimal growth of linerboard capacity," Ernst said.

UPBEAT FREE-SHEET OUTLOOK. Heavily driven by the forms and business papers segments, demand for uncoated free-sheet papers will grow at an average annual rate of 3.5% between 1983 and 1993, according to Boise Cascade Corp. vice president and White Paper Div. general manager, Terry Lock.

Society is shifting toward an information culture where data is cheap, readily accessible and voluminous, Lock told analysts. As such information-age tools as computers, copiers and word processors spread, so too will demand for uncoated free sheet—particularly forms and business papers. Boise Cascade forecasts that uncoated free-sheet shipments will grow from a base of 8.7 million tons in 1983 to 12.2 million tons in 1993, an overall increase of 3.5 million tons, or 40%, over the ten-year period. Over the same period, gross national prod-

Chesapeake Corp. will present a paper on its innovative new linerboard machine and Carl Geist will describe the outlook for U.S. liner exports at *Pulp & Paper*'s First International Unbleached Kraft Conference, Nov. 12-13, 1984, at the Vista International Hotel, New York, N.Y. For information contact:

Pulp & Paper Seminar Dept.,
370 Lexington Ave.,
New York, N.Y. 10017
Telephone: (212) 683-9294.

TABLE 3: **Projected U.S. kraft linerboard supply and demand (000 short tons).**

	1982	1983	1984e	1985e
Demand				
Domestic	12,715	13,968	15,069	15,482
Export	1,820	2,100	2,070	2,295
Total	14,535	16,068	17,139	17,777
Supply	16,588	17,014	17,800	18,043
Operating rate	88%	94%	96%	98%

e=Estimate.

8.7 million tons in 1983 to 12.2 million tons in 1993, an overall increase of 3.5 million tons, or 40%, over the ten-year period. Over the same period, gross national product is expected to grow at an average annual rate of 2.9%, while the industrial production index will climb 3.7% a year. In the shorter term, Boise Cascade expects demand to grow 4.5% this year and 5.0% in 1985.

Uncoated free-sheet production in the U.S. totaled 8.7 million short tons in 1983, about 13% of total U.S. paper and paperboard output. Although free-sheet products are essentially interchangeable, different distribution channels allow the grade to be broken up into market segments. At 25% apiece, offset and business papers are the largest two segments, followed by form bond at 20%, envelope at 8%, tablet at 5%, and cover and text at 3%, with other products accounting for the remaining 14%.

Over the past ten years, uncoated free-sheet shipments have grown at an average annual rate of 2.7%, Lock said, increasing the size of the market by 30%, or 2 million tons. This compares favorably with other paper and board grades, where growth ranged over the same period from a 4.8%/year rate for coated free-sheet papers to a 0.6% annual decline for kraft papers.

The bulk of uncoated free-sheet demand since 1973 has occurred in the forms bond and business papers segments, fueled by the growth of such end-uses as copiers, up 20% a year, and computers, up 15% a year. Over the past ten years, shipments of business papers grew 56%, from 1.4 million tpy in 1973 to 2.2 million tpy in 1983. Forms bond shipments almost matched that pace, rising 53% over the same period, from 1.1 million tpy in 1973 to 1.7 million tpy last year, the Boise Cascade executive said. In contrast, tablet shipments rose 31% between 1973 and 1983; offset, 20%; and envelope, 23%.

CAPACITY ADDITIONS. Uncoated free-sheet's supply/demand relationship has been reasonably good over the past decade, Lock pointed out. Capacity was added at the rate of 3.0% per year from 1973 to 1983, compared to demand growth of 2.7% a year, and operating rates averaged 91.4%. Based on historical operating rates, uncoated free-sheet capacity will need to increase by 3.6 million tons over the next ten years to meet forecast dend, Lock said. Working out to 3.9%/year, such an increase would boost capacity from 9.2 million tons in 1983 to 12.8 million in 1993, enough to meet projected demand of 12.2 million tons at 95% operating rates.

Boise Cascade expects U.S. producers to go ahead with the required expansion—equivalent to 1.7 new paper machines a year—although at least half of the capacity expansions will be accomplished through rebuilds of existing machines, he added. The company expects capacity to grow 4.7% this year and 6.0% in 1985 as new and converted machines come online.

TABLE 4: **Projected western European kraft liner supply and demand (000 metric tons).**

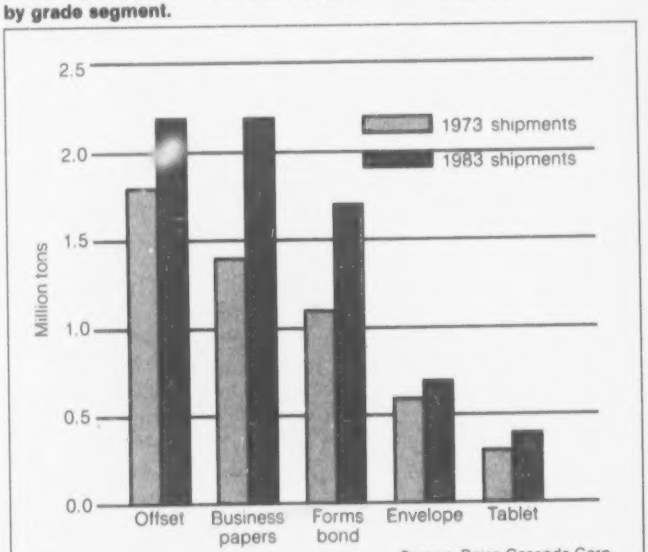
	1983	1984e	1985e
Total kraft liner demand	2,495	2,551	2,611
Western European capacity			
Scandinavia	1,260	1,270	1,307
Other western Europe	663	690	715
Total capacity	1,923	1,960	2,022
Minimum required imports	572	591	589
Estimated imports	895	870	940

Source: Weyerhaeuser Co.

Tight markets rather than competitive disadvantage govern uncoated free-sheet imports into the U.S., according to the Boise Cascade executive. Imports have grown dramatically this year, rising from 221,000 tons in 1983 to an annualized rate of 500,000 tpy in mid-1984. Imports are expected to diminish, however, due to such problems as longer lead times and less service offshore. The new domestic capacity coming online this year should also ease tight markets. Imports have been concentrated in tablet, stock tab and offset, Lock said, tending toward heavier-weight, commodity-type products.

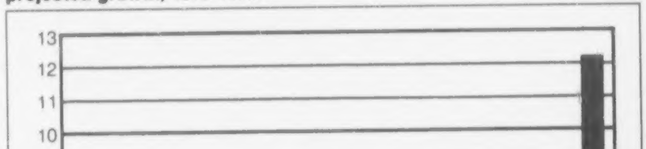
LWC FORECAST. Demand for lightweight coated paper will grow an average of 4.1%/year over the next ten years, Boise Cascade forecast, compared to a growth rate of 4.5% over the past ten years. Growth will be fueled by the same macroeconomic factors affecting uncoated free sheet but with different end-use factors, including growth in advertising, magazines, commercial printing, direct mail and catalog. U.S. producers shipped 3.0 million tons in 1983, and a 4.1%/year growth rate would translate into an additional 1.5 million tons by 1993, a 49% increase over current levels. ■

FIGURE 2: **Uncoated free-sheet shipments, historical growth by grade segment.**



Source: Boise Cascade Corp.

FIGURE 3: **Uncoated free-sheet shipments, historical and projected growth, 1973-1993.**



Source: Boise Cascade Corp.

Peroxide demand by mills continues to rise in 1984

By BARRY SHOCKETT

The surge in domestic consumption of hydrogen peroxide, which began in the second half of 1983, has continued into 1984, albeit at a lower rate since the summer. The sharp boost in peroxide demand resulted in an unusually high level of imports—by the end of May, more than 8,000 tons (as-is basis) had been imported. However, as production picked up this year, imports dropped substantially—the total for 1984 being estimated at 10,000 tons.

By 1986, Canada should be a net exporter of hydrogen peroxide as DuPont Canada (40,000 tons) and FMC (11,000 tons) begin domestic production in Maitland, Ont., and Squamish, B.C., respectively.

U.S. statistics, hydrogen peroxide (000 short tons[1])

	1981	1982	1983	1984e
Nameplate capacity	193	193	179	179
Production	112	110	123	137
Apparent consumption	107.5	105	115	129
Pulp bleaching	13	13.5	15.5	17
Exports	8	8.2	11.2	14
Imports	3.5	3.2	3.1	6

1. On 100% basis. e = Estimated.
Sources: Bureau of Census, U.S. Dept. of Commerce; *Pulp & Paper* estimates.

Canadian statistics, hydrogen peroxide (000 short tons[1])

	1981	1982	1983	1984e
Total demand	7.2	7.5	8.9	11.0
Pulp bleaching	4.9	5.1	6.4	7.1
Miscellaneous[2]	2.5	2.4	2.5	3.3
Imports	7.2	9.6	11.3	12.0

1. On 100% basis. e = Estimated.
2. Including textile bleaching and water treatment.

HYDROGEN PEROXIDE

UNITED STATES

Uses: Hydrogen peroxide is used by the pulp and paper industry to bleach chemical and mechanical pulps as well as to deink recycled newspaper stock. The major use of H_2O_2 is as a chemical intermediate.

Demand: An estimated 17,000 tons of H_2O_2 will be used by pulp mills in 1984 compared with the 15,500 tons used in 1983. Total consumption is expected to increase to 129,000 tons from the 115,000 tons estimated for last year. Chemicals, textiles, and municipal water treatment together account for 52% of peroxide demand compared with the 13% to 14% held by pulp mills. Industrial effluent treatment (9%) is continuing strong growth.

Sources: The three U.S. producers (in descending order of capacity) are: FMC, E.I. DuPont, and Interox America. FMC's 10,000-tpy expansion at its Bayport facility, due onstream by year-end, will bring domestic capacity to the 189,000-ton level for 1985. By the end of 1986, North American capacity should reach the 240,000-ton mark.

Availability: The increase in North American capacity over the next two years will ensure an adequate supply for the foreseeable future. 1984, market; 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: Peroxide prices rose 2¢/lb on July 1, about 18 months after the previous boost. Until Jan. 1, 1983, prices had been steady for two years. The bulk 70% solution tag is now 45¢/lb, f.o.b. works, freight equalized. Pricing history: 1983, 43¢/lb; 1982, 39.5¢/lb; 1981, 39.5¢/lb; 1980, 35.5¢-36.5¢/lb; 1979, 32.5¢/lb.

Forecast: Continued growth in mechanical pulping and greater H_2O_2 usage by kraft mills could easily result in a 9% to 10% increase in pulp mill demand in 1985. However, a more conservative figure for next year is 18,000 tons. The next price boost should occur in mid-1985.

CANADA

Uses: Mechanical pulp bleaching and chemical pulp bleaching account for most of the H_2O_2 consumed in Canada. Other end uses include textile bleaching and water treatment.

Demand: Hydrogen peroxide usage in the pulp and paper industry was up about 25% last year to an estimated 6,400 tons compared with the 5,100 tons used in 1982. Consumption in 1984 is expected to reach 7,700 tons with total demand rising to 11,000 tons compared with almost 9,000 tons in 1983.

Sources: Peroxide imports continue to supply the total Canadian market, but the share of U.S. shipments in 1983 dropped to about 76% of the total (from 90%). Major importers are still C-I-L (from FMC), DuPont Canada (from its U.S. parent), and Interox America (via its new Toronto terminal).

Availability: There is enough U.S. capacity to handle Canadian needs for at least the next two years. 1984, market; 1983, market; 1982, market; 1981, tight to market; 1980, market to tight.

Pricing: Prices went unchanged for 18 months and then rose about 10.5% on July 1, reflecting the price boost in the U.S. Bulk, 70% solution, tank trucks, f.o.b. Toronto, Ont./Montreal, Que., is now \$1.43/kg (65¢/lb). Pricing history is as follows: 1983, \$1.295/kg (58.7¢/lb); 1982, \$1.157/kg (52.5¢/lb); 1981, \$1.157/kg (52.5¢/lb); 1980, 95.8¢ to \$1.05/kg (43.5¢ to 47.6¢/lb); 1979, 90.6¢ to 95.8¢/kg, (43.1¢ to 43.5¢/lb).

Forecast: The continued growth in thermomechanical pulping combined with the switch of some newsprint mills to higher-brightness groundwood specialties could boost H_2O_2 demand to almost 9,500 tons in 1985 and to 17,000 tons in 1988. No further price hikes are anticipated before the middle of next year.

Mr. Shockett is consulting editor-chemical markets for Pulp & Paper.